The American Journal of Pharmaceutical .... Education ....

THE OFFICIAL PUBLICATION OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

"When criticism ceases, the process of improvement will likewise cease and our educational process will go into decline."—Channcey I. Cooper, Howard University.

"Opinions cannot survive if one has no chance to fight for them."—Thomas Mann.

Volume XVI July, 1952 Number 3

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THE AMERICAN JOURNAL
OF
PHARMACEUTICAL EDUCATION

Volume XVI **July, 1952** **Number 3**

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Published quarterly by the American Association of Colleges of Pharmacy at Lincoln 8, Nebraska. (Jacob North & Co.) Subscriptin price $4.00. Single copies $1.00. Entered as second class matter July 1, 1937, at the postoffice at Lincoln 8, Nebraska, under the Act of August 24, 1912.

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The Need for Education Training for Teachers in Colleges of Pharmacy*

JOSEPH L. KANIG and LEONARD T. CHAVKIN
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The practice of modern pharmacy requires a diversified knowledge drawn from the physical, natural and biological sciences in addition to specialized professional training. Such a diversified knowledge is necessary since the pharmacy college graduate may elect to practice his profession on the retail level or enter any of the many industrial, governmental or hospital activities open to him. These fields include work in the sales, administration, production, developmental and clinical branches.

Today, as never before, the college of pharmacy must be prepared to equip its graduates with a broad professional background which will enable them to enter any of the phases of the profession.

Evolution of Pharmaceutical Education in the United States

To better illustrate the problems of the pharmacy teacher of today we will briefly trace the evolution of pharmaceutical education in the United States since the beginning of the Twentieth Century.

The requirement of a formal education and the conferring of the academic degree as a requisite for the practice of pharmacy is only a relatively recent development.

Fifty years ago, the preceptor-apprentice system of training pharmacists prevailed. Anyone seeking a career in pharmacy obtained a position as an apprentice in a pharmacy where his employer, acting as his preceptor, gave him the necessary training to pass the state board examinations and to practice his profession. In no state was college attendance obligatory.

From the turn of the century until 1932 the colleges of pharmacy in the United States were conducted as evening schools or day schools which offered courses requiring attendance only three days

*The authors hold assistant professorships in Columbia Universtiy College of Pharmacy. This paper is the result of their efforts while participating in a college teachers workshop at Sarah Lawrence College, Bronxville, N. Y., under the sponsorship of the School of Education, New York University.—Ed.

per week. In 1932 the present four year course with a minimum of five days of instruction per week was made a general requirement. At this time, the Bachelor of Science degree was awarded and became a mandatory prerequisite for the licensing examinations in most states. This course originally provided a minimum of 3000 hours of instruction which, however, was increased to 3200 hours which minimum is still in effect today.

Thus, the past fifty years have seen pharmaceutical education progress from the complete absence of formal education to the presentday status of recognized university training. Far-sighted educators throughout the country realize the importance of continuing to modify and supplement educational requirements in order to keep pace with the needs of the profession. Their thoughts center about establishing a two year pre-pharmacy course as preparation for entrance into a pharmacy college. This would result in an extension of the present curriculum to five or six years. Several pharmacy colleges have already adopted such standards. At present the six pharmacy colleges in New York State are considering the adoption of extended five or six year curricula in the near future.

Many of the colleges throughout the country offer graduate study leading to the Master of Science and Doctor of Philosophy degree in Pharmacy. These advanced courses were instituted to supply the graduate with the additional specialized technical training demanded for positions in the pharmaceutical manufacturing industry and teaching institutions.

The Teacher of Pharmacy

Although great strides were made in the last half-century in the educational requirements for the practice of pharmacy, we feel that the requirements for the teacher of pharmacy have not kept pace.

The first recognized teacher of pharmacy was the preceptor. These practicing pharmacists undertook the training of the apprentice in the practical aspects and skills of the profession. The first colleges of pharmacy employed as faculties outstanding retail pharmacists who taught, on a part-time basis, the same arts and skills to a larger group of students. In other words, this was merely an enlargement of the preceptor system. Gradually, as the curriculum was extended to embrace allied sciences, the colleges hired teachers

who were specialists in these sciences although not necessarily pharmacists.

Today, a modern college draws its faculty members for the teaching of the professional courses from the graduate schools of pharmacy. The non-professional courses are usually taught by non-pharmacists who are specialists in their fields. Many of the colleges found university affiliation to be advantageous in that they could call upon members of the university faculty to teach some of the non-professional courses.

Curriculum Problems

Due to the great moral and social responsibilities of the practitioner of pharmacy in modern society it is recognized that the curriculum must consist of a blending of general education and specialized training. It has long been the aim of those concerned with the pharmacy curriculum to include more humanistic and social education courses in order that the graduate be prepared to meet these responsibilities as well as the demands of his professional practice. However, with daily advances in medical science becoming a common occurrence, the need for more extensive and intensive professional specialized courses in the curriculum is keenly felt. The more progressive colleges have kept abreast of the latest developments by adding new courses and augmenting existing courses with the latest professional knowledge and techniques. Since we may expect this situation to continue, with perhaps even greater intensity, it is hardly conceivable that college authorities may easily overcome the justifiable criticism leveled against the professional graduate of being highly overspecialized in his training.

In the light of these facts the proposed extension of the curriculum to five or six years will alleviate the strain on the technical courses but at the same time will leave little room for the inclusion of the vitally needed general education courses *per se*.

A possible solution to this problem has been proposed by the educators who maintain that a two year prepharmacy liberal arts education will serve to sufficiently broaden the pharmacy student's training.

We feel that such a plan is hardly an adequate solution to the problem for several reasons:

1. **The social-humanistic aims of this plan cannot be achieved by merely leading the student through a series of unrelated liberal arts courses. It is our contention that a well planned and integrated general education program will best serve to prepare the future pharmacist to take his place in society as a citizen and a practitioner.**
2. **A two year prepharmacy liberal arts program will be considered by the student as merely a hurdle which must be overcome in order to gain admission to professional study.**
3. **Unless basic professional courses are offered concurrently with the prerequisite courses, proper motivation for the student will be lacking and in most cases he will fail to appreciate the professional-humanistic relationship.**
4. **Due to the constant expansion of professional courses as previously stated, there may not be sufficient time in an extended curriculum to offer adequate general education courses and still allow for the needed expansion of the professional program.**

In view of this situation we feel that the best approach to the problem is the extension of the curriculum to five or six years wherein general education is infiltrated into the professional courses.

Our opinion is borne out by the following statement by Cora E. Taylor:

"The complementary relationship between special and general education is recognized, and it is urged that general education continue throughout the specialized and professional period of training. A blending of general and special education can make the technical content of professional courses more significant to the professional student . . . Professional schools are in need of teachers with a broad outlook and social awareness which they can weave into technical courses, thus enriching the student's education. *Indeed, the teacher is the key to the success of the general education program."* **(*) (Italics are our own).**

Inadequacies in Pharmacy Teacher Training

Is the pharmacy teacher of today suited for the execution of this plan? To arrive at an answer to this question let us briefly examine the qualifications of pharmacy faculty members and administrators.

Under present conditions the sole requisite for appointment is the attainment of the M.S. or Ph.D. degree in Pharmacy. Promo-

(*) Taylor, Cora E., Current Issues in Education for the Professions, **Current Issues in Higher Education, 1950,** Department of Higher Education, National Education Association of the United States, Washington, D. C.

tion or salary advances are based, for the most part, on graduate degrees plus scientific productivity in the area of pure research. It is a rare instance when teaching ability is the sole basis for advancement. As a result of this shortsighted system practically no teachers have had any training in how to teach.

Administrators are generally drawn from the ranks of teachers and thus the inadequacy is extended to the upper levels. Too often one finds as the head of a pharmacy department, or dean of a college, a person who has demonstrated research ability but is completely lacking in teaching and administrative talents. As a result of this lamentable situation, the areas of admissions procedure, curriculum planning and evaluation, testing student performance, and student guidance and counseling, among others, are rarely given proper treatment.

The requisites for the teachers of the non-professional courses are essentially similar to those for the professional course teachers. The problem in connection with this group centers about the fact that since they are not pharmacists they are not usually concerned with nor appreciative of the immediate and long range plans and needs of the profession. Hence they are poorly qualified to direct their students along the paths leading toward the betterment of the profession, nor to adequately screen out those students who are not suited to the practice of pharmacy. These teachers are guided solely by the scholastic achievements of their students which should not be the only basis for advancement in a field where moral-social responsibilities are so closely integrated with technical knowledge. On the other hand, the professional course teacher, though he is vitally concerned with promoting the high ideals and moral standards of the profession, is poorly equipped to indoctrinate his students with these concepts and even more sadly lacking in the means of evaluating student achievement and progress.

Therefore, we can make the observation that both groups of teachers are lacking in the qualifications necessary to coordinate their efforts toward proper integration of general education into the technical curriculum. In all fairness, it must be pointed out that under the present system there is little opportunity given to joint programs.

Recommendations for Pharmacy Teacher Education

In our opinion, the ideal teacher of pharmacy who would best be prepared to assume the responsibilities in an extended and integrated curriculum would be one with a broad knowledge of the technical aspects of pharmacy coupled with a comprehensive general education training. This ideal may be brought into being by offering to the Bachelor of Science in Pharmacy, who desires to pursue a career in pharmaceutical education, a graduate program which will increase his store of scientific knowledge and also train him in the area of general education.

Such a program today, would necessitate cooperation on the graduate level between a school of pharmacy and a school of education. There exists many obstacles in the path to this affiliation. The concepts and requirements of the two schools are so divergent as to almost preclude any cooperation toward the granting of a joint degree.

What steps should then be taken in the face of these obstacles? Obviously, the solution must lie in establishing a new division in the graduate schools of pharmacy which would direct programs leading to graduate degrees in pharmaceutical education. This system could easily obviate the difficulties encountered by the graduate student in attempting to meet the requirements of two different schools.

This new division should be staffed by teachers who have completed graduate training in the school of pharmacy and the school of education. These educators would form the vanguard of the movement which will have as its objective the training of the ideal pharmacy teacher.

This division of pharmaceutical education would have the added responsibility of conducting seminars and workshops in which the entire faculties of the colleges of pharmacy would participate in the development and coordination of improved teaching and administrative methods.

Our visions will become realities when the Doctor of Philosophy degree in Pharmaceutical Education will be recognized as the best preparation for the teacher of pharmacy in colleges throughout the country.

The Undergraduate Course in Pharmacology —Laboratory

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Although pharmacology is a basic pharmaceutical science in its own right, it borrows freely from and contributes generously to the subject matter and technics of other pharmaceutical disciplines. It accepts, from pharmaceutical chemistry, structure-activity-relationships which are important in understanding the mechanism of drug action. It draws, from courses in pharmacy, the forms of drug administration and their application to routes of administration. It utilizes information, from pharmacognosy, concerning the source, active constituents and physical characteristics of naturally occurring drug products. On the other hand, pharmacology repays with interest the pharmaceutical chemical approach to structure-activity-relationships by opening new fields of synthesis. To basic pharmacy courses it contributes information concerning the efficacy of various vehicles, bases and galenical combinations. To pharmacognosy it provides a useful tool for revealing Nature's therapeutic secrets.

The professional knowledge which the practitioners of retail pharmacy uses most frequently, whether it be in selling or rendering a service to the health professions, is that which deals with pharmacological problems. It is the pharmacist's knowledge of this subject which helps to protect the public from nostrums and drugs of questionable therapeutic value. It enables the pharmacist to guard the health of the community by recognizing the need for prompt medical attention. His knowledge of the action and therapeutic use of the many new and potent drugs enables him to be a source of information for the medical profession. In times of emergency, such as individual poisonings and community disasters, his knowledge of pharmacology is of great practical value. A recent prescription survey in the State of Utah shows that only seven per cent of prescriptions require compounding[1]. Therefore if this situation obtains in other states it is quite obvious that the pharmacist of today has only limited opportunity to apply the basic technics acquired in courses in pharmacy, pharmacognosy and pharmaceutical chemistry. Does

this state of affairs imply that a knowledge of solubility, stability, ionization, incompatibles, etc., is becoming of lesser importance to the practicing pharmacist? In any event the pharmacist should understand the mechanism of action, therapeutic use, dosage and toxicity of every prescription he handles, whether it requires compounding or is dispensed as manufactured. Therefore, it is apparent that pharmacology should occupy an important position in the pharmacy curriculum.

In such a discussion it is well to remember that our primary objective is to train retail pharmacists and not specialists in the various pharmaceutical disciplines. Therefore, prejudice and self interest should be set aside in favor of educational principles which will provide the student pharmacist with the best training for his chosen profession. In view of present day prescription trends, it is apparent that such a program should include a practical understanding of pharmacology. Inasmuch as one learns most readily by doing, laboratory work should be an integral part of this training.

The laboratory method of teaching is time-consuming and costly. The majority of students are unskilled in laboratory methods and require more time for this type of instruction. In addition, special equipment and required materials make laboratory instruction one of the most costly of all educational procedures. Properly used, however, it becomes probably the most effective teaching device known. Therefore, laboratory work should be planned so effectively that it will merit the expense involved.

Objectives

Laboratory work in pharmacology, like that in most fields, can either be complex and theoretical or simple and practical. In general, highly complex and esoteric experimental pharmacology should be reserved for graduate courses and has little relevance for the undergraduate laboratory. The objectives of a practical pharmacology laboratory and its relation to the practice of pharmacy have been described in the articles by Christensen[2], Dille[3], Hiner[4] and White[5]. Many worthwhile suggestions will be found in these publications.

The nature and extent of the laboratory work in pharmacology is influenced by the objectives desired. Such objectives, when well chosen, apply not only to a laboratory work in pharmacology but also to any lecture-laboratory course. For convenience these o'-

jectives may be divided into three classes: (1) transformation and correlation of lecture material, (2) scientific reasoning, and (3) technic. A closer examination will reveal their special relation to pharmacology.

1. **Transformation and correlation of lecture material.** The primary objective of the pharmacology laboratory should be to explain, expand, clarify and dramatize the salient points covered in the lecture. The work should be planned to follow in logical sequence the theoretical material presented in lecture. All too frequently the lecture course is unrelated to the laboratory work.

By the time the average pharmacy student takes pharmacology, he has been drilled for two or three years in the preparation of drugs, the significance of incompatibles, and the organic synthesis of certain compounds, but not once has he seen a drug in action. The laboratory, therefore, becomes the place where the student can see for himself the biological effects produced by drugs. He can see how drugs modify normal or altered physiological processes. Experiments can be selected to show the rational basis for modern therapy. On occasion, they may even be designed to show that some of our currently employed drugs can no longer be considered valuable therapeutic agents and merit a deserved obsolescense.

In previous classes the student pharmacist has learned the doses and the forms which drugs are administered. Beginning lectures in pharmacology usually give consideration to the factors which modify the dose of a drug. The laboratory should be used to show the influence of such factors as the weight of the animal, route of administration and the rate and channel of excretion on the therapeutic dose of a drug. In addition, a simple experiment showing the range between the effective and the toxic dose of a drug gives tangible meaning to the term "margin of safety." Studies on nephrectomized and hepatectomized animals illustrate how the organs of excretion and detoxification affect potency and duration of drug action.

An important aspect of any lecture course in pharmacology is a consideration of the toxic action produced by the injudicious use of therapeutic agents or by individual hyper-susceptibility to these compounds. On many occasions the practicing pharmacist is called upon to suggest first-aid treatment in acute accidental poisonings or

to render an opinion as to proper antidotal procedures in therapeutic mishaps. An understanding of the mechanism by which various drugs produce their toxic effects enhances the student's understanding of the proper treatment which should be instituted. Therefore, some laboratory experiments should be designed to show the toxic effects of the more common agents, and the appropriate treatment of poisonings.

2. **Scientific reasoning.** It is well known that the rapid advances in the medical and the pharmaceutical sciences have markedly influenced the character of prescriptions now being written by physicians. Current prescriptions require little compounding skill on the part of the practitioner of pharmacy and in all probability will require even less in the future. This imposes new obligations upon those who train pharmacists and those who practice pharmacy. One obligation is that the pharmacist be trained as a professional man with a specialized knowledge of drugs. This training should be of such caliber that the pharmacist will be in a position to act as a source of drug information to practitioners of medicine. To do this the pharmacist must be curious and willing to keep abreast of new advances and able to read the trade literature intelligently, to reason scientifically and to use good judgment.

There is no guarantee that a student will learn to think more clearly by virtue of a laboratory course in pharmacology. However, if the laboratory is properly organized the student can learn to handle new ideas and material and can be stimulated to do much thinking for himself. In addition, he accurately records observations and correctly summarizes and interprets data, and under the guidance of a skilled instructor he can learn to draw conclusions on the basis of scientific reasoning. Wherever possible, experiments should be designed to develop such abilities.

3. **Technics.** Every science has technics and procedures which are peculiar to it. Few of the technics learned by the student in the pharmacology laboratory are essential for the compounding of a prescription. Nevertheless, they do contribute to the student's general professional background and to his understanding of the subject.

By actual experimentation he learns how to administer drugs to various animals. Such training will be especially valuable to him in a community where veterinary products are of economic

importance. He learns the use and care of laboratory animals and equipment. He becomes proficient in the use of hypodermic syringes and needles and in the basic technics of parenteral injection. Likewise, he acquires some of the elementary technics used to demonstrate drug action.

Demonstrations and visual aids may be employed to show some of the more complicated experimental and clinical procedures. Carefully selected motion pictures will teach the student many things that cannot be presented in the laboratory, such as clinical cases and the responses of patients to medication.

If all three objectives discussed above are realized the pharmacy student will have acquired a fundamental knowledge of pharmacology which will enable him to converse intelligently with the best physicians in his community. A major interest of the physician is drug therapy. The problems which he brings to the pharmacist often center on questions of new therapeutic agents, ways of dispensing drugs, dosage, and the actions and uses of drugs. The pharmacist should be trained to the point where he can contribute intelligently and be of real practical service to the physician in this common field which he shares with the medical profession. It is too much to expect the physician to view the pharmacist as a professional equal if the latter is not able to contribute and serve in the one science which is common to both professions.

Selection of Experiments

The problem of selecting experiments for the pharmacology laboratory is influenced not only by the objectives just discussed but also by several additional factors. Some of the more important factors are: (1) relative importance of the various groups of drugs, (2) teaching value of the experiment, (3) ease of student participation, (4) laboratory equipment and personnel, and (5) animal supply.

1. Relative importance of various groups of drugs. The problem of selecting experiments dealing with the important drugs is of major significance. It involves not only the question of the relative importance of U.S.P., N.F., and N.N.R., drugs and specialties, but also the question of how much time should be allocated to each group. This question of time can be resolved in a measure by following the recommendations of the pharmaceutical survey that each college of pharmacy periodically study the current pre-

scriptions written in the area served by the institution[6]. The findings of such a survey delineate the obligations involved upon those who train pharmacists and for those who practice pharmacy. The fulfillment of these obligations requires that therapeutic advances be kept in mind when selecting experiments in order to avoid serious gaps in the current body of knowledge which should be imparted to students. The University of Utah College of Pharmacy is currently conducting such a state-wide prescription study. Preliminary results show that U.S.P. drugs account for 23.1 per cent, N.F. drugs 1.5 per cent and specialties for the remaining 75.4 per cent of all prescription items. Thirteen drug groups account for 86.7 per cent of the items dispensed. These groups and their contribution to the total number of prescriptions analyzed are shown in the following table.

The Pharmaceutical Classification of Prescriptions in Utah (January to April 1951)

Drug Group	Per Cent of Prescriptions
Analgesics	5.0
Antihistaminics	5.8
Anti-infectives	36.9
Antibiotics	18.5
Sulfonamides	9.3
Misc.	9.1
Antispasmodics	2.3
Cardiovascular Agents	3.3
Central Stimulants	3.4
Expectorants	2.6
Gastro-intestinal Agents	1.8
Hematinics	3.8
Hormones	2.0
Inhalants	4.0
Vitamins	7.5
Sedatives and Hypnotics	8.4
Miscellaneous Agents	13.2
Anticonvulsants	
Antinauseants	
Antirheumatics	

The above table indicates those groups which presumably should receive major emphasis. The details of this study indicate the rela-

tive importance of the principle drugs in each classification, as measured by the current prescription writing activity of physicians in the State. It should be remembered that other groups of drugs, such as general anesthetics, local anesthetics, antiseptics, and parenteral fluids are extensively used in the practice of medicine although they are not common prescription items. Most certainly such information is useful not only as a basis for selecting experiments for laboratory work in pharmacology but also as a basis for selecting lecture material. A word of caution is necessary. Slavish adherence to the results of such surveys as that just mentioned will certainly mean that the instructor will accept as valid therapeutic agents many items of questionable value being sold in quantity merely because of current fads and misleading advertising.

2. **Teaching value of the experiment.** Consideration should be given to the teaching value of each experiment. The simpler an experiment, the better. To be of most value an experiment should be designed to show clearly only a few mechanisms or phenomena at a time. However, even the most dramatic experiment will fail as a teaching tool if an astute instructor is not present to pursue the various implications and ramifications of the experimental results.

3. **Ease of student participation.** Certain experiments should also be selected on the basis of ease of student participation. In general, experiments which permit student groups to work on various aspects of a single problem are most useful. In this type of experiment the results of the various student groups are correlated to show the final over-all result. Such a procedure also permits the multiple data to be used as an introduction to elementary statistical procedures.

4. Laboratory equipment and personnel. Limited equipment is not a valid reason for omitting laboratory work in pharmacology. Equipment for this course is no more expensive than for other basic sciences in the curriculum. With a little ingenuity an instructor can devise many worthwhile experiments with a minimum budget. It should be emphasized that it is not extensive "plumbing" and expensive" gadgets" that make a successful pharmacology experiment, but it is the presence of a good instructor to stimulate the student and to assure that the laboratory observations are correctly interpreted. Special research interests being pursued by

members of the staff sometimes provide unusual equipment and technic for simple informative and dramatic experiments or demonstrations. These experiments often prove to be the most valuable of all teaching aids. In view of these facts it is obvious that the range of experiments will vary in each institution according to the equipment and the budget available to pharmacology, and the training and availability of competent personnel.

5. **Animal supply.** Many students approach the pharmacology laboratory with mixed feelings. They have weird ideas concerning the type of experiments and the extent of surgery required in this course. The average pharmacy student has neither the training nor the technic to perform extensive surgery. Therefore, the majority of student experiments should be done on intact animals or require only a minimum of surgery. In addition, each institution has its own problems concerning the procurement of animals. For example, at our institution it would be very unwise to enter into competition for an already inadequate supply of dogs and cats. In view of these facts, dogs and cats are used only for an occasional demonstration and the rabbit, guinea pig, rat, mouse and frog are used for student experiments. It is of utmost importance that the student learn to respect the welfare of the experimental animal. Animals should be treated kindly and spared all discomfort possible during the course of the experiments. Failure to observe the proper care and humane handling of experimental animals is a major offense and should exclude the offender from further participation in the course.

Hours and Credits

The 1942 Syllabus[7] recommended that 80 clock hours be devoted to laboratory work in pharmacology, including bioassay. This would be approximately one three-hour laboratory session per week for one year. The Curriculum Committee[5] recommended 3 credit-hours for each of two semesters with no suggestions relative to the time spent in the laboratory. The Pharmaceutical Survey[6] recommends a total of 24 semester-hours of credit in pharmacology and related sciences without specific recommendations as to how it is to be used. However, if laboratory work is recognized as a useful and important teaching discipline, then this type of instruction should be carried on during the entire course in pharmacology. Therefore, an ideal arrangement would appear to be 3 hours of laboratory work

and 3 hours of lecture each week for one academic year. It is on this basis that the following syllabus is suggested.

Syllabus

This outline is not intended to be complete but is designed mainly to list typical experiments which the author has found of value in teaching pharmacology to pharmacy students. Likewise, it should not be implied that the motion pictures listed are the only ones considered of value. The ones included in the outline are merely examples of motion pictures which have been found to be suitable teaching aids. No attempt has been made to differentiate between demonstrations and student experiments. It is recognized that the proportion of time devoted to each will vary according to the ability of the instructor, available equipment and animals, and other factors. Finally, it should be emphasized that the outline is not final and should constantly be revised in keeping with changing therapeutic trends and with the development of new pharmacological technics and agents.

I. METHODS OF GENERAL PHARMACOLOGY

A. Drug Administration.

1. Experiments.

a. **General Technic of Handling, Weighing and Injecting Animals.**

In this experiment the various procedures for handling, weighing, and injecting animals are demonstrated and the students practice the technics in rats.

b. **Effect of the Route of Administration on the Action of Fixed Anesthetics.**

This experiment is designed to show how the route of administration affects onset and duration of action of sodium pentobarbital in rats.

2. Motion Pictures.

a. **Conservation of Syringes and Needles.**

One reel; color; 30 minutes. This motion picture clearly illustrates the manufacture and proper care of hypodermic syringes and needles. Courtesy Becton, Dickinson and Company.

b. **Technics of Injection.**

One reel; color; 20 minutes. Demonstrates the procedure for intradermal, hypodermic, intramuscular and intravenous injection. Courtesy Becton, Dickinson and Company.

B. Distribution and Fate of Drugs.

1. Experiment.

a. **Absorption and Excretion of Drugs by Man.**

This experiment is intended to show that considerable variation exists in the rate of excretion of drugs (potassium iodide, sodium salicylate, quinine, etc.) in saliva and urine; also demonstrates the effect of pH upon the absorption and fate of methenamine.

C. Variations in Response to Drugs.

1. Experiment.

a. **Individual Variations in Response to Sodium Pentobarbital Injections.**

This experiment illustrates the individual variation to a fixed dose of sodium pentobarbital in mice. A distribution curve is constructed and its relationship to individual sensitivity discussed.

D. General Toxicology.

1. Experiments.

a. **Acute Carbon Monoxide Poisoning.**

b. **Acute Cyanide Poisoning.**

c. **Nicotine Poisoning.**

d. **Strychnine Poisoning.**

These experiments are designed to show the general symptoms and treatment of poisoning due to these agents. In the case of strychnine, the site of action is localized.

II. PHARMACOLOGY OF THE CENTRAL NERVOUS SYSTEM.

A. General Anesthetics.

1. Experiments.

a. **The Relation Between Concentration and Effect of Inhaled Anesthetics.**

This experiment shows the intensity of pharmacological action is dependent, among other things, upon the concentration of drug.

b. **Demonstration of Distribution Coefficient.**

This is the classical demonstration illustrating the quantitative relation between narcotic strength and lipid affinity.

2. Motion Pictures.

a. **The Advent of Anesthetic Ether.**

One reel; sound; 12 minutes. A re-inactment in the old Massachusetts General Hospital of the first publicized demonstration of ether anesthesia.

b. **Signs of Inhalation Anesthesia.**
Two reels; 25 minutes. Presents good illustrations of stages and planes of anesthesia. Obtained from the American Medical Association.

c. **Vinethene.**
Color; 12 minutes. This film shows the performance of several short operations under Vinethene anesthesia and its use as an induction agent prior to ether. Courtesy of Merck and Company.

B. Hypnotics and Sedatives.

1. Experiment.

a. **The Fixed Anesthetics and Hypnotics.**
This is a comparative study in rats of typical drugs used as fixed anesthetics.

2. Motion Picture.

a. **Chronic Barbiturate Intoxication.**
One reel; color with commentary; 30 minutes. This film shows the effect of the chronic administration of pentobarbital and amytal in man. The acute disturbances following withdrawal of barbiturates are clearly shown. Courtesy Dr. Harris Isbell, Public Health Service Hospital, Lexington, Kentucky.

C. Antiepileptics.

1. Experiment.

a. **Assay of Antiepileptic Drugs.**
Anticonvulsant activity of diphenylhydantoin and trimethadione is demonstrated by two of the most useful assay procedures. The data obtained permit an introduction to biological statistics.

D. Analgesics.

1. Experiments.

a. **Measurement of Analgesic Activity in Man.**
Analgesic potency of morphine and codeine is determined by the Hardy-Wolff-Goodell pain threshold apparatus.

b. **Effect of Acetanilid on Pain Threshold of the Rat.**
Analgesic potency is measured by the rat-tail, radiant-heat method.

c. **Special Biological Test for Morphine** (Straub and Hermann).
This illustrates the characteristic S-shaped curvature of the tail produced by morphine. It may also be used as an assay for curare.

2. Motion Picture.

a. **Opiate Addiction.**
One reel; black and white; silent; 20 minutes. This

film shows the addictive and withdrawal symptoms of morphine, codeine and Dilaudid on the monkey. Courtesy Bilhuber-Knoll Corp.

E. Central Stimulants.

1. Experiments.

a. **The Effects of Metrazol.**
This experiment demonstrates the characteristic convulsions produced by metrazol and the antagonistic effect of pentobarbital.

2. Motion Pictures.

a. **Coramine.**
One reel; color; sound; 45 minutes. Includes animations showing mechanisms of respiratory stimulation, apparatus for measuring accumulated tidal volume and meth ods for optical registration of intrathoracic, vascular and intra-abdominal pressure. Courtesy Ciba Company.

b. **Pharmacological Study of Metrazol.**
One reel; color; sound; 50 minutes. Includes demon stration of analeptic action and effects on respiratory and circulatory systems under ordinary laboratory conditions. Courtesy Bilhuber-Knoll Corp.

III. PHARMACOLOGY OF THE AUTONOMIC SYSTEM.

1. Experiments.

a. **Effects of Autonomic Drugs on the Isolated Frog's Heart.**
This experiment shows the effect of epinephrine on the rate and amplitude of the isolated heart beat and demonstrates how the rate change can be used to measure adrenergic blockade.

b. **Effects of Autonomic Drugs on Circulation.**
Demonstrates the action of various drugs upon the autonomic nervous system as indicated by blood pressure response.

c. **Effects of Autonomic Drugs on Intestinal and Gastric Motility.**
Shows the effects of epinephrine, pilocarpine, atropine sulfate, prostigmine, carbachol, and barium chloride on gastrointestinal motility.

d. **Miotics and Mydriatics.**
The pupillary response of various miotic and mydriatic agents is measured in the rabbit.

2. Motion Picture.

a. **Mecholyl Chloride Administered by Ion Transfer.**
One reel; color; 12 minutes. Illustrates the method for administration of methacholine chloride by means of the gal-

vanic current and shows the result in a case of chronic ulcer and in case of scleroderma. Courtesy Merck and Company, Inc.

IV. THE PHARMACOLOGY OF LOCAL ANESTHETICS.

1. Experiments.
   a. **Local Anesthesia in Man.**
      The absence and recurrence of sensitivity to pain is determined following the intracutaneous injection of procaine hydrochloride with and without epinephrine.
   b. **Measurement of Local Anesthesia in the Frog.**
      A comparative study of local effects of butacaine and procaine upon reflex time in frogs.
2. Motion picture.
   a. **Regional Anesthesia.**
      Four reels; color; 50 minutes. This film depicts abdominal block, spinal anesthesia, sacral plexus block, cervical plexus block, brachial plexus block, and ulnar and median nerve block in man. Anatomical illustrations and reproductions of special models are employed to show the path of the needles used in inducing anesthesia of the various regions. Several types of actual operative procedures are shown. Courtesy of Winthrop Chemical Company, Inc.

V. PHARMACOLOGY OF HISTAMINE AND ANTIHISTAMINICS.

1. Experiments.
   a. **Experimental Bronchial Asthma Due to Atomized Histamine.**
      Shows the protective effect of pyribenzamine in a guinea pig exposed to atomized histamine.
   b. **Antihistaminics in the Prevention of Anaphylactic Shock.**
      Demonstrates the protective action of antihistaminics against a shocking dose of horse serum in guinea pigs.
2. Motion Pictures.
   a. **Allergies.**
      One reel; sound; color; 45 minutes. Describes the histamine theory of allergic reaction and the mechanism of action and use of antihistaminics, (neohetramine) in treating allergic manifestations. Courtesy Wyeth Company.

VI. PHARMACOLOGY OF THE UTERUS.

1. Experiments.
   a. **Influence of Drugs on the Activity of the Isolated Uterus.**
      Demonstrates the method of recording normal uterine activity and its alteration by the common agents.

VII. PHARMACOLOGY OF THE HEART AND CIRCULATION.

1. Experiments.

a. **Effects of Digitalis on the Frog Heart.**

Designed to show that the effect of digitalis on the intact heart varies with the concentration.

b. **Determination of Normal Blood Pressure and Effects of Epinephrine, Pitressin, Amyl Nitrite and Chloroform.**

Emergency treatment of shock and hypertensive states frequently require the use of an agent to alter blood pressure. This experiment shows the effect of several commonly used agents on blood pressure in rats. The blood pressure may be determined by direct carotid cannulation or indirectly by means of a photo-electric tensiometer.

2. Motion Pictures.

a. **Management of the Failing Heart.**

One reel; color; sound; 35 minutes. Impairment of heart function due to auricular fibrillation, constrictive pericarditis and pericardial effusion and effects on respiratory system are shown. The management of the patient in heart failure shows the value of properly instituted bed rest and how salt restriction maintains the proper extra-cellular fluid balance to reduce edema. Effects of mercurial diuretic and "Digitaline Nativelle" are evaluated. Courtesy Varick Pharmacal Company.

b. **Cardiac Arrhythmias.**

One reel; color; 18 minutes. Graphically illustrates various cardiac arrhythmias and correlates them with the electrocardiogram. Courtesy Abbott Laboratories.

c. **Mechanism of the Heart Beat.**

One reel; silent; black and white; 20 minutes. This film by animated diagrams, describes the anatomy and nervous control of the heart with simultaneous analysis of the normal electrocardiogram. Courtesy Bilhuber-Knoll Corp.

VIII. PHARMACOLOGY OR DIURETICS AND ANTIDIURECTICS.

1. Experiment.

a. **Diuretics and Antidiuretics.**

This experiment shows the effect of water, 0.9% sodium chloride solution, posterior pituitary, intraperitoneal glucose solution and mercurial diuretics on urine excretion in rats.

IX. PHARMACOLOGY OF CATHARTICS.

1. Experiments.

a. **Effect of Hypotonic, Isotonic, and Hypertonic Solutions on Gastro-Intestinal Contents.**

Demonstrates the osmotic properties of various ions and how they affect the bulk and character of the stool.

X. PHARMACOLOGY OF THE BLOOD.

1. Experiments.

a. **Effect of Heparin and Dicumarol on Blood Coagulation and Prothrombin Time.**

This experiment demonstrates the action of these agents on the blood of rats by determination of coagulation and prothrombin time.

b. **Effect of Phenylhydrazine on Red Blood Cell Count and Hemoglobin Determinations.**

This experiment is used to illustrate how some agents alter the blood.

2. Motion Picture.

a. **Animated Hematology.**

One reel; silent; color; 45 minutes. Excellent film describing the physiology of the hemopoietic principle and the various diseases caused by an insufficient number or malfunction of the erythrocytes. Courtesy of Armour Laboratories.

XI. ANTI-INFEVTIVES.

A. Anti-syphlitics.

1. Experiment.

a. **The Effect of Organic Arsenicals on the Motility of Trypanosomes and on Experimental Trypanosoma equiperdum Infection in Rats.**

The chemotherapeutic effect of oxophenarsine hydrochloride is demonstrated in rats.

B. Antibiotics.

1. Experiments.

a. **Assay of Antibiotics.**

Penicillin is assayed by the disk method.

b. **An Antibiotic with a Wide Range of Antimicrobial Spectrum.**

The broad spectrum of aureomycin is shown on culturing sputum with various concentrations of the antibiotics.

2. Motion Picture.

a. **Aureomycin.**

One reel; color; 45 minutes. This film shows the method of isolation, testing and determination of antibiotic spectrum. Courtesy Lederle Laboratories.

C. Sulfonamides.

1. Motion Picture.

a. **Sulfonamide Therapy.**

Three reels; color; 45 minutes. The story of sulfonamides from the synthesis in 1908 to the present. In cludes chemical synthesis, formulas, crystalline appear-

ance, mode of action, excretion, toxicity, and clinical use. Courtesy Lederle Laboratories.

XII. PHARMACOLOGY OF DRUGS OF ENDOCRINE ORIGIN.

1. Experiments.

a. **Effect of Thyroid and Antithyroid Agents on Metabolic Rate.** The metabolic rates of rats receiving thyroid and propylthiouracil are compared with that of normal rats.

b. **Characteristics of Insulin Convulsions and their Control.** This experiment illustrates the character of insulin convulsions in mice. A comparative study of the efficacy of various agents in controlling insulin convulsions is conducted.

2. Motion Pictures.

a. **The Male Sex Hormones.**
One reel; color; sound; 20 minutes. Shows the origin of the male sex hormone, its metabolic effects, the deficiency state, and the effects of exogenous male sex harmone in a variety of clinical conditions. Courtesy Schering Corporation.

b. **The Physiology of Normal Menstruation.**
One reel; color; sound; 22 minutes. Presents the basic physiology necessary for the intelligent understanding of the pharmacology of female hormones. Courtesy Schering Corporation.

c. **Hypothyroidism.**
One reel; sound; color; 48 minutes. The essential clinical entities of hypothyroidism such as cretinism, juvenile, adult and pituitary myxedema are dealt with in great detail, with typical patients shown. Effect on the metabolism is depicted pharmacologically and clinically. The recommended therapy to restore patient to normal is analyzed thoroughly. Courtesy Medical Film Guild.

XIII. PHARMACOLOGY OF THE VITAMINS.

1. Motion Picture.

a. **Vitamins—And Some Deficiency Diseases.**
Three reels; color; sound; 45 minutes. This film is presented in two sections, one dealing with vitamins A, C, D, E, and K, and the other with the vitamin B complex. The laboratory scenes cover deficiencies in experimental animals and biological and chemical methods of assay. Clinical deficiencies shown include cheilosis, scurvy, rickets, pellagra, and vitamin K deficiency. Courtesy Lederle Laboratories.

XIV. PHARMACOLOGY OF THE SKIN AND MUCOUS MEMBRANES.

1. Experiments.

a. **Effect of Agents on the Skin and Mucous Membranes.**
This experiment is intended to show the characteristic effect of corrosives and irritants on skin, hair and connective tissue.

2. **Motion Pictures.**
   a. **Skin Antiseptics.**
      One reel; sound; black and white; 20 minutes. A presentation of the various types of comparative tests which are used for the evaluation of antiseptics. Tincture of iodine is compared with three organic mercury antiseptics. Results frank ly favor the use of iodine. Courtesy Iodine Educational Bureau, Inc., N. Y.

Laboratory Aids

Demonstrations. The demonstration method of teaching pharmacy students in the pharmacology laboratory has been advocated by some teachers,—in preference to students experiments,—on the basis that it allows the student to concentrate on the purpose and results of the experiment, that it requires less equipment and that it permits more effective use of the time available. If a valuable experiment requires apparatus and technics so complex that the major part of the student's time is needed to master them, it is perhaps better for the instructor to demonstrate it. On the other hand, if the experimental procedure is simple and well adapted to student use, even limited equipment is not a valid reason for a demonstration rather than a student experiment, because the student groups can be rotated. Student experiments require little if any more time than demonstrations. An important limiting factor in favor of demonstrations is that of availability of animals,—especially dogs and cats,—for student experiments. Although the demonstration method is most useful for those experiments requiring larger animals and/or complex apparatus, student participation is a far better method of teaching.

Examinations. Periodic examinations should be an integral part of a well-planned laboratory course in pharmacology. The laboratory work assumes greater importance if the student knows he is going to be examined specifically on material covered in the laboratory. In addition to its pedagogic value, the laboratory examination provides an additional index for student evaluation and indictates to the instructor the effectiveness of his laboratory teaching.

Examinations may take a myriad of forms, the discussion of which is beyond the scope of this presentation. The author prefers those examinations which tests the student's ability to apply fundamental principles learned in the laboratory to novel situations.

Laboratory Manuals. There are many factors which influence the selection of experiments in pharmacology. As a result most instructors prefer to prepare their own laboratory manuals. The advantage of such a procedure is two-fold. First, the experiments can be designed to secure maximum use of available equipment. Second, it permits greater flexibility and encourages the instructor to constantly revise the manual as new technics and new therapeutic agents appear. Although most manuals have been published primarily for use at an author's institution, several have found acceptance in other schools.

Library. In view of the rapid advances in the field of pharmacology and therapeutics, students should be encouraged to read regularly the current journals. The library references pertinent to each experiment should be listed. The student should then read these references as a required portion of the laboratory work. Such reading will not only provide a greater appreciation and understanding of the technics employed in the pharmacology laboratory, but will also emphasize the importance of reading the current periodicals in order to keep up with this dynamic subject.

Motion Pictures. Many motion picture films have been prepared for teaching pharmacology and also for the medical profession. Unfortunately, many of the films prepared for pharmacology are not available on a loan basis. On the other hand, many of the films are prepared specifically for the medical profession and are not entirely suitable for or pertinent to pharmacology. It is therefore necessary to select films carefully on the basis of their direct application to pharmacology and the practice of pharmacy.

How much time should be devoted to motion pictures and should they ever be used to replace experiments or demonstrations? Certainly the student should see for himself the action of a considerable number of drugs in experimental animals and should become acquainted with the more common experimental technics. On the other hand, carefully selected motion pictures will show the student many things that cannot be presented in the laboratory, such as clinical cases and the response of patients to medication. Students should be prepared before the motion picture is presented either by their reading of pamphlets provided by the distributor of the film or by a review of the salient points by the instructor.

Summary

In summary, it may be stated that pharmacology is of major importance in the pharmacy curriculum. It is also recognized that laboratory work is one of the most effective methods of teaching. Therefore, laboratory work should be an integral part of the undergraduate course in pharmacology. The objectives of this laboratory course should be to transform and correlate the lecture material in a logical sequence, to develop scientific reasoning, and to provide an opportunity to learn technic. The laboratory work should be flexible and constantly revised to include the new agents of therapeutic value. Experiments should also be selected on the basis of the teaching value, ease of student participation, available laboratory equipment, and animal supply. A selected list of experiments and motion pictures which have been found useful in teaching pharmacology to pharmacy students has been reviewed. Laboratory aids, such as demonstrations, examinations, laboratory manuals, the library, and motion pictures, should be integrated with student experiments. Finally, the pharmacist should be trained in pharmacology to the point where he can contribute intelligently and be of real practical service to the other health professions. It is too much to expect practitioners in the other health sciences to view the pharmacist as an equal if he is not properly trained in the very science which is fundamental to his profession.

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Pharmaceutical Education in Utah—I* (1917 - 1927)

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Prior to World War I, there were in the Inter-Mountain Empire states only two institutions of higher learning that offered formal training in pharmacy: the University of Montana, Missoula, which began teaching pharmacy in 1907, and the University of Colorado, Boulder, whose school of pharmacy dates from 1911[1]. The lack of opportunity to learn their profession in Utah, other than by apprenticeship, had forced and was forcing prospective pharmacists to seek their education at these two schools or at the several others about the country, on the West Coast, in the Middle West, and as far east as Philadelphia. Although the laws of the state at that time did not require any work at the collegiate level, the State Board examinations were sufficiently difficult that organized training was almost necessary to pass them satisfactorily. This unhappy state of affairs was discussed at various times by the practicing pharmacists, particularly by those whose sons were put upon to travel considerable distances to school; however, no real steps were taken towards a remedy.

One Utah pharmacist undertook in 1917 to tutor private students in pharmaceutical lore. He was Ralph Nelden, born in Salt Lake City and educated at the Philadelphia College of Pharmacy, whence he was graduated in 1908 with the degree of Doctor of Pharmacy (for three years' study). His private lessons were conducted at night in his home, and the fee charged was seventy-five cents per student per night. Classes ran in size from eight to twenty students. For purposes of laboratory instruction, tables were set up in the basement of the house, and equipment and supplies were furnished so that the students could manufacture and study the common types of pharmaceutical preparations. For texts, Dr. Nelden used primarily Remington's *Practice of Pharmacy* and Sadtler's fam-

*Presented at the joint session of the Section on Historical Pharmacy of the American Pharmaceutical Association and the American Institute of the History of Pharmacy at the 1951 meeting in Buffalo.

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ous works on pharmaceutical chemistry. The regular course of instruction ran for six months; at the end of that time, the student received no certificate, but he was supposed to be ready to qualify for the State Board examination in pharmacy. In the case of failures in the examination, Dr. Nelden offered a "refresher" course of three months' duration. Begun in 1917, this course of private instruction flourished until 1923, when the legislature made law the requirement that new applicants for examination be graduates of a recognized school of pharmacy[2].

There existed at this same time the University of Utah, which had been founded by Brigham Young and his pioneering Mormons on February 28, 1850, and which included among its teaching divisions a good school of medicine. Within the medical school there were lecture and laboratory facilities that had possibilities of expansion to include at least a two-year course in pharmacy. In 1916, Dr. Leroy D. Swingle, then Assistant Professor of Pharmacology, surveyed these potentialities and inquired of the Utah State Board of Pharmacy whether they would support a plan to organize a department of pharmacy as a part of the school of medicine. The board members were unanimous in their approval, and the problem was presented to the administrative officials of the university. With their encouragement and with the cooperation of the other related departments, two-year, three-year, and four-year curricula in pharmacy were planned.[3]

When the department of pharmacy was officially opened to students in 1917, the catalogue of the university carried the following notice:

"It is the purpose of the University to establish a department of pharmacy equal in quality to schools in Class A.* This department has been made a part of the Medical School and will have the advantages of the school's equipment as well as such special equipment as will be needed.

"Students presenting evidence by acceptable certificate or by examination of having satisfactorily completed the equivalent of a high school course of four years will be admitted to any course in pharmacy. It is suggested that their work include physics, mathematics, history, botany, and some work in commercial branches. Anyone desiring to enter, but

*This use of the term "Class A" is a mere figure of speech stemming probably from the classification system in use at the time for colleges of medicine. Classification of pharmacy schools did not commence until after The Pharmaceutical Survey (1948).[4]

unable to meet the entrance requirements, is invited to correspond with the President or with the Dean of the School of Medicine.

"Three groups of courses are offered: A two-year group, leading to the degree of Graduate in Pharmacy (Ph.G.); a three-year group, leading to the degree of Pharmaceutical Chemist (Ph.C.); a four-year group, leading to the degree of Bachelor of Science in Pharmacy (B.Sc.). This last degree is on a par with the other bachelor degrees offered by the University. It is advised that students make an effort to take the three-year or the four-year course, as it is difficult to crowd into two years the subject matter which should constitute the training of all druggists."

For professional courses in the university, special tuition was charged, and in the case of pharmacy, the fee was placed at fifty dollars per year.

General Development

The new department of pharmacy was set up in two rooms: a stock room and laboratory and an office and lecture room.[5] As the catalogue had pointed out, not much more room was needed since the facilities of the medical school were made available to the pharmacy students.

Apparently the first two years of the department's existence were very successful and the demands put upon the students were considered of a high level; for, in 1919, the Utah State Legislature passed a law allowing registration of graduates from the University of Utah "College of Pharmacy" on presentation of their diplomas—without examination.[6] This practice was questioned by authorities within the Department of Business Regulation, but in the light of advancing academic requirements it was continued for several years, until 1925. In 1923, the scholarship standards for new applicants were raised by the legislature to require, in addition to previous qualifications, a full four-year high school course and graduation from a recognized school of pharmacy. Allowances were made however, for practicing assistant pharmacists to become registered without college training.

In 1922, the department began to seek membership in the American Conference of Pharmaceutical Faculties.* Previous application had not been possible since applicants must have been organized for at least five years. In preparation, the pharmacy laboratories were

*Although this intention was announced in the *Pacific Drug Review* in a note written by Thompson himself, application to the A. C. P. F. was never formally made. "He undoubtedly had it in mind and got it on paper prematurely."[4]

remodeled, new desks were installed with hot and cold water, gas, and a complete set of equipment for each desk. The Utah Pharmaceutical Association made an appropriation of $300 toward the purchase of equipment, and Prof. Harry Landis Thompson, head of the department, made a gift of a $250 prescription case. A further enlargement was made in the drug garden, which was being cultivated for the dual purpose of studying common plant drugs and of screening plants indigenous to Utah for ones of possible medicinal value.[7]

Beginning with the fall of 1924, the two-year curriculum was discontinued and only the three-year and four-year courses were offered. Entering freshmen for the first time were assigned university wide freshman requirements that had to be fulfilled in English, hygiene, and physical education or military science. In addition, one year of economics and one year of Latin or of advanced English were needed for graduation. These requirements were instituted to maintain the so-called Class "A" rating.[8]

Also in 1924, records of a two-way inspection appear.. Members of the medical profession, representing the Medical Association of Utah, visited the campus on an inspection tour that included a visit to the pharmacy department. They found the laboratory well equipped and commented on the compactness of both lecture and laboratory facilities; the arrangement was such that the students could see the apparatus demonstrated during class and still have it convenient to use during the laboratory period. On the other hand, the head of the department made a tour of inspection for the Department of Business Regulation of the State of Utah and was surprised to see how some of the drug stores were run and how many grocers and other dealers were handling drugs and poisons. His trip covered nearly the entire state and his reports included many stores, but what action was taken on them is not a matter of record.[9]

Many ideas were used to maintain student interest in academic work as well as in professional opportunity. In the senior drug assay class, samples were taken from the preparations made by the freshmen; and as usual, some students were found to have made the mistake of putting wrong labels on their bottles, and on titration, acid and alkali strengths were found to be inaccurate from errors in making up the preparations. This training showed both the fresh-

men and the seniors the importance of accuracy in pharmacy. The class in commercial pharmacy made visits to the various drug stores in Salt Lake City and Ogden to get the practical side of pharmacy and to watch the pharmacist actually at his work. Prof. Thompson benefited from his inspection trip by guiding his students to the more professional retail and wholesale outlets; the John Culley store in Ogden was among those visited.[10]

The class in history of pharmacy in 1926 set about gathering photographs of old time scenes of drug stores in the early days of Utah and of the druggists who operated them. Stereoptican slides of the better photographs were made and filed, together with data of an historical nature. It was hoped eventually to build up a back-log of information covering a fairly complete history of pharmacy in the state. During the lecture periods in the history of pharmacy course, students gave talks on the important men in pharmacy; and while these men were being discussed, the stereoptican was used to show their pictures. The history students also prepared papers, to which photographs were attached, about the stores in the communities from which they came.[11]

These plans bore fruit for as long as they were permitted to operate. But steps were taken to close the department in 1927, and these activities necessarily ceased as the students completed their courses and graduated. Paradoxically, the month of July, 1927, was fixed by the legislature as the final date for registration of assistant pharmacists by experience and examination only, without graduation from a college of pharmacy.

Faculty[12]

When, in 1917, the department of pharmacy was created within the school of medicine, the man who assumed the responsibility of the new curricula was Dr. Leroy Dey Swingle, Assistant Professor of Pharmacology. His interest was a natural consequence of the still prevalent practice of teaching prescription writing to the medical students within the scope of their courses in pharmacology. Dr. Swingle, a native of Pennsylvania, had received the degree of Doctor of Philosophy from the University of Nebraska in 1908 and had been appointed to the faculty of the University of Utah in 1913. An excellent man in his field, Prof. Swingle was a member of a number of scientific societies including the American Pharmaceu-

tical Association, American Men of Science and Sigma Xi. At the time he took on his duties in the new department, his rank was raised to that of Associate Professor of Pharmacology. This position he held until 1923, when he departed the services of the university.

In 1919, Prof. Swingle took a sabbatical leave, and to carry on during his absence, Harry Landis Thompson was brought to Utah from the faculty of the University of Nebraska; his appointment was that of Assistant Professor of Pharmacology. He had been reared in the atmosphere of pharmacy: his father, J. H. Thompson, was a pharmacist in his native state of Nebraska, and during his young life, Prof. Thompson ran the gamut of drug store experience. He received both the baccalaureate and Master of Arts degrees from the University of Nebraska, where he carried out this graduate studies under the direction of Dean R. A. Lyman. He was active in the American Pharmaceutical Association, Sigma Xi, and Phi Delta Chi. He came to the University of Utah with the desire to render a sincere and sympathetic service to the profession by taking upon himself the responsibility of teaching young men and women entering the field. In 1921, Prof. Thompson's title was changed to Assistant Professor of Pharmacy and Head of the Department of Pharmacy. In 1922, he was advanced in rank to Associate Professor of Pharmacy, which was his official designation until the school was discontinued.

From 1924 to 1926, Prof. Thompson was assisted in his teaching duties by Walter Everett Boyden, a native of Utah and a graduate in pharmacy (Ph.G.) from the university. He returned to school to continue his studies in the school of business and was appointed Assistant in Pharmacy. He served in that capacity for two years until he was awarded the degree of Bachelor of Science in Business. He, like his associate, had come from a notable pharmaceutical background, being the son and nephew of the Boyden brothers, pharmacists of Coalville, Utah.

In 1923, Ralph Orlando Porter was appointed to the university faculty as Professor of Pharmacology and Dean of the School of Medicine. Dr. Porter had received his undergraduate training at Utah State Agricultural College, and had taken courses in medicine at Northwestern University, Harvard University, and Rush Med-

ical College, being awarded the Doctor of Medicine degree from Rush in 1916. He came to the university directly from a thriving practice of medicine and surgery, having served to the date of his appointment as medical director and manager of the Cache Valley General Hospital. His appointment to the faculty was in the same year as Prof. Swingle's resignation, and after 1923, his name appears in the catalogues with that of Prof. Thompson as a part of the pharmacy department staff. How much of the teaching of pharmacy was actually in his hands the catalogues do not specify; however, it may safely be assumed from changes made in the description of classes that his courses were pharmaco-dynamics, toxicology, and biological assaying.

Curricula [13-25]

An examination of the curricula of the department of pharmacy reveals the very skeletal nature of the training necessarily crowded into the two-year course as compared with the more broadening education made possible by three and four years of work. In the early years of the department, virtually all of the courses in pharmacy were required of all pharmacy students, terminal as well as baccalaureate. In addition, all students were assigned courses in botany, chemistry, economics, physiology, and pharmacology. For the three-year program, courses in English, physics, physiological chemistry, and bacteriology were added; and the four-year curriculum was extended beyond these requirements in the direction of languages and broader background material.

It was not until 1920, a year after the advent of Prof. Thompson, that the baccalaureate candidates were required to take several professional courses for which there was not room in the two-year program. At this time the latter plan of study was limited to professional courses plus such closely related essentials as botany, chemistry, economics, physics, and bacteriology. The longer program included all of these and, in addition, courses in English, languages, business, pathogenic bacteriology, and pharmacology, as well as the several advanced professional courses.

When, in 1924, the three-year curriculum displaced entirely the two-year program, the basic requirements in English and the biological, chemical, and physical sciences, offered during the first three years for both three-year and four-year students, were identical; and the fourth year was then given over to an extension of the work in purely advanced professional subjects, with room for electives that were chosen by the student. Thus, there can clearly be shown a swing from a four-year emphasis on cultural studies to a senior year set apart for professional and business courses of a more exhaustive nature.

In 1927, the Board of Regents decided to discontinue the work in pharmacy; therefore, only the third year of work was conducted. No mention of pharmacy was made in the 1929-1930 issue of the catalogue, but senior classes of some sort must have been arranged, since the last two pharmacy students graduated from the university in 1930 with baccalaureate degrees.

Table I lists the courses offered by the department, together with the credit hours assigned to each, and shows the changes wrought over the years by variations in faculty, curricula, and degrees offered.

(Continued on Page 402)

Fulbright Awards.—Announcement has been made for the 1953-1954 competition for Fulbright Awards for university lecturing and post-doctoral level research in Europe and the Near East. Included in the competition are awards for Austria, Belgium and Luxembourg, Denmark, Egypt, France, Greece, Iraq, Italy, Netherlands, Norway, Turkey, The United Kingdom and Colonial Dependencies, Japan, Pakistan, and The Union of South Africa.

Application Forms and additional information is obtainable from Conference Board of Associated Research Council's Committee on International Exchange of Persons, 2101 Constitution Avenue, Washington 25, D.C. This competition is specifically for university lecturing and post-doctoral level research. Graduate students desiring to enroll for courses abroad or to pursue a directed program of studies at the pre-doctoral level should apply to their local Fulbright Adviser or directly to the Institute of International Education in New York City, New York.

Application for university lecturing and advanced research must be post marked no later than **October 15, 1952.**

TABLE I

Course numbers, credit hours, and required pharmacy courses offered by the University of Utah (1917-1927), as influenced by changes in faculty, plans of study, and degrees offered.

Notes: (1) The first number is in every case the course number, preceded in the catalogue by the departmental designation, *Pharmacy*.
(2) The number enclosed in parentheses represents the hours of credit awarded for each course.
(3) Unless otherwise noted, the courses were required of all students in pharmacy.

	1917–1918	1918[2]–1920	1920–1921	1921–1922	1922–1924	1924–1925	1925–1927	1927 1928
Faculty	Swingle		Swingle - Thompson			Thompson - Porter		
Years of Study	2 - 3 - 4		2 – 4			3 – 4		
Degrees	PhG-PhC-BS		PhG – BS (A)			PhC	PhG - BS (A)	
Theory of Pharmacy	1 (3)	1 (3)						
Laboratory Practice	2 (2)	2 (2)						
Mat. Med. & the Presc.		3 (3)						
Introductory			1 (3)	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)
General			2 (3)	2 (3)	2 (3)	2 (3)	2 (3)	2 (3)
Galenical			3 (3)	3 (3)	3 (3)	3 (3)	3 (3)	3 (3)
Pharmacognosy	3 (3)	4 (8)	4a(3)	4a(3)	4a(3)	7a(3)	107a(3)	107a(3)
	4 (2)		4b(3)	4b(3)	4b(3)	7b(3)	107b(3)	107b(3)
			4c(3)	4c(3)	4c(3)	7c(3)	107c(3)	107c(3)
Manufacturing	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	4 (3)	4 (3)	4 (3)
	6 (3)	6 (3)	6 (3)	6 (3)	6 (3)	5 (3)	5 (3)	5 (3)
		7 (3)	7 (3)			6 (3)	6 (3)	6 (3)
Dispensing	7 (3)	8 (3)	8 (3)	7 (3)	7 (3)	8a(3)	108a(3)	108a(3)
				8 (3)	8 (3)	8b(3)	108b(3)	108b(3)
						8c(3)	108c(3)	108c(3)
Drug Assay	8 (3)							
Chemical Drug Assay		9 (4)						
Phar. Assay, General			9a(3)	9a(3)				
Inorganic			9b(3)	9b(3)	9a(3)	9a(3)	109a(3)	109a(3)
Organic			9c(3)	9c(3)	9b(3)	9b(3)	109b(3)	109b(3)
Alkaloidal						9c(3)	109c(3)	109c(3)

	1917[1]-1918	1918[2]-1920	1920–1921	1921–1922	1922–1924	1924–1925	1925–1927	1927–1928
Faculty	Swingle	Swingle - Thompson				Thompson - Porter		
Year of Study	2 - 3 - 4	2	–		4	3	–	4
Degrees	PhG-PhC-BS	PhG	–		BS (A)	PhC	PhG - BS (A)	
Biological Drug Assay		10 (2)[3]	10 (3)[4]	10 (3)[4]	110 (3)[4]	11c(3)	11c(3)	11c(3)
Toxicology & Posology	9 (3)	11 (3)	11 (3)					
Pharmaco-Dynamics				11a(3)	11a(3)	11a(3)	11a(3)	11a(3)
Toxicology				11b(3)	11b(3)	11b(3)	11b(3)	11b(3)
Commercial Pharmacy	10 (1)	12 (2)	12 (3)	12 (3)	12 (3)	12 (5)	112 (5)	112 (5)
Latin	11 (1)							
Jurisprudence	12($\frac{1}{2}$)	13 (1)	13 (1)	13 (1)	13 (1)	14a(1)	14a(1)	14a(1)
						14b(1)	14b(1)	14b(1)
Advanced Assay,								
Crude Drugs			14 (3)	14 (3)	114 (3)[4]	121 (3)[4]	121 (3)[4]	
Volatile Oils			15 (3)	15 (3)	115 (3)[4]	122 (3)[4]	122 (3)[4]	
Adv. Dispensing			16 (3)	16 (3)	116 (3)[4]	126 (3)[4]	126 (3)[4]	126 (3)[4]
Crude Drug Raising			17 (2)	17 (2)	117 (3)[4]	123 (3)[4]	123 (3)[4]	
History of Pharmacy			18 (1)	18 (1)	18 (1)	13a(1)	13a(1)	13a(1)
						13b(1)	13b(1)	13b(1)
						13c(1)	13c(1)	13c(1)
Analysis of Drugs and Medicines,								
Qualitative				19 (3)	119 (3)[4]	124 (3)[4]	124 (3)[4]	124 (3)[4]
Quantitative				20 (3)	120 (3)[4]	125 (3)[4]	125 (3)[4]	125 (3)[4]
Proprietary						127 (3)[4]	127 (3)[4]	121 (3)[4]
Toilet Preparations						128 (3)[4]	128 (3)[4]	122 (3)[4]
Photographic						129 (3)[4]	129 (3)[4]	123 (3)[4]

[1]Semester system.
[2]In 1918, the university began the quarter system, which has remained in force to date.
[3]Required of three-year and four-year students.
[4]Required of four-year students only.

Student Activities

The position of the pharmacy student, whose terminal college career was limited to two or three years, was a peculiar one. Most collegiate extra-curricular activity programs, geared to the four-year plan of study, held little appeal to the pharmacy student. Even if the interest was there, the time was too restricted to allow a rise of the participating student to a position of any authority within the activity of his choice. As a consequence, the early pharmics were thrown, for the most part upon their own resources.

Several of the students at the University of Utah did find time to become active with Greek letter social fraternities, local and national. In 1925, seven students in pharmacy petitioned the school for the establishment of a professional fraternity in pharmacy.[25] Because Prof. Harry Landis Thompson, head of the department, was a past member of Pi Chapter of Phi Delta Chi, the proposed name of the local organization was to have been Pi Delta Chi, and the purpose of the group, aside from its professional aims, was to petition the national fraternity of Phi Delta Chi to establish a chapter on the Utah campus. The petition ran various stages of the gauntlet but was refused recognition by the President and Board of Regents of the University. The signers of the petition were: W. Everett Boyden, Coalville, Assistant in Pharmacy; Wayne E. Allred, Paris, Idaho; L. Stanford Briggs, American Fork; Eldon L. Frost, Ephraim; David O. Johnson, Salt Lake City; Fred Huddy, Park City; and Clare Storrs, Richfield.

The one successful venture of the department to furnish an extra-curricular outlet for its students was the University of Utah Pharmaceutical Society, established early in the history of the pharmacy department, and more or less active during the existence of that department. The only limitation on membership in the organization was its restriction to students registered as majors in pharmacy.

The professed aim of the group was to "get its members in close contact with their profession by having prominent professiona

pharmacists from the state to lecture." This aim was accomplished as proposed and, as well, by cooperating admirably with the Utah Pharmaceutical Association. In May, 1922, the department of pharmacy was closed so that the students could attend the Utah Pharmaceutical Association Convention. We find here a note that "Miss Manda Booth, winner of the pharmacy scholarship and only girl student* at the present time in pharmacy, gave a good talk on 'Woman's Place in Pharmacy' before this convention."[26]

The society fulfilled its social obligations to the students with luncheons, dances, and parties. One such party, held in 1925, was reported thus:[27] "The Pharmacy Society gave its first big 'blow-out' of the year, February 17, in the John R. Park [Administration] Building. The decorations consisted of some novel displays, kindly lent by local drug stores, and some original show cards designed by Aldous Anderson, and written by Kohnhorst, senior pharmacy students. The motifs were red and white [the university colors]. Miss Manda Booth, a senior in pharmacy, received much deserved ap-L. Thompson, accompanied by Mrs. Kohnhorst on the piano, added to the enjoyment with two solos. C. L. Walters, a senior vocation student of pharmacy, amused with a personal sketch. Following a varied program, refreshments were served. The orchestra then struck out with 'The Strychnine Blues' and the rest of the evening was given to dancing. During intermission, punch was served from an elaborate punchbowl which had been built to represent a mortar."

After the two year course was discontinued and the students' campus life was lengthened to three or four years, their interests in extra-departmental contacts stabilized and many of them contributed commendably to the various university student organizations and activities.

Graduates

Typical of the academic programs of the era, three degrees were offered to the students enrolled in the University of Utah

* According to the commencement program, however, another girl, Ruth Sophia Anderson, was awarded the Ph.G. degree along with Miss Booth in 1922.

plause for her clever rendition of a comic recitation. Professor H.

Department of Pharmacy. For two years' work the Graduate in Pharmacy (Ph.G.) certificate was given; an additional year of study warranted the degree of Pharmaceutical Chemist (Ph.C.); and the full, four-year curriculum led to the baccalaureate degree in pharmacy. It is of interest to note, however, that the Ph.C., degree was never conferred by the University of Utah. The three-year course was dropped in 1919 after two years and not offered again until 1924, when it replaced the two-year course. Then, in 1926, before students in the three-year category were candidates for graduation, the degree conferred for three years of study was changed from Pharmaceutical Chemist back to Graduate in Pharmacy.[28]

As long as the laws of the state (until 1923) did not require graduation from a school of pharmacy, there were students who attended the school only long enough to get sufficient information to pass the board examinations and did not bother to finish their educations.[5] The ruling of the legislature in 1919 which allowed registration of University of Utah graduates in pharmacy without examination no doubt placed many students in quite a dilemma. The traditional senior comprehensive examinations (still given at Utah) confronted the graduate on the one route to registration, and the state board examinations constituted a high hurdle on the other. In some cases a solution resulted from point of time: When state board examinations were held in July, the June graduates suffered the rigors of comprehensive examinations and graduation without objection. On the other hand, when state board examinations were held in May and the members of the June graduating class were permitted to take the boards early, some failed to return to school for graduation. It is difficult to account for this apparent lack of interest in the academic phase of the pharmacy career.

Table II gives the number of graduates, year by year and the grand totals from 1921 to 1930. Before that time, the two-year graduates, not having completed a standard baccalaureate curriculum, were not recognized at commencement. However, when four-year students did become eligible for graduation, all candidates in pharmacy were listed.[29]

TABLE II

Conclusion

Table II. Degrees conferred and number of graduates from the University of Utah Department of Pharmacy, as recorded in commencement programs, 1921-1930.

	Ph.G.	B.S.	B.A.	Total degrees	Recipients of second degrees	Total graduates
1921	5	2	....	7	2	5
1922	3	....	....	3	....	3
1923	5	1	....	6	1	5
1924	7	....	1	8	1	7
1925	6	2	....	8	1	7
1926	....	1	....	1	....	1
1927	6	4	....	10	4	6
1928	4	1	....	5	....	5
1929	4	2	....	6	....	6
1930	....	2	....	2	1	1
Grand totals	40	15	1	56	10	46

In 1927, when to all appearances the University of Utah Department of Pharmacy was strong in numbers and support, its budget was suddenly cut off. Appeals made by Prof. Thompson to the faculty and administration went unheeded by both. With the approval of the Board of Regents, the school of medicine, short of funds, had cut expenses by simply eliminating the department. Students already registered in pharmacy were allowed to complete their courses and graduate, but no new students were enrolled.[5]

At first glance, this hewing away of the department of pharmacy might seem ruthless and lamentable. In reality, it constituted the real emanciptation of pharmacy in the field of education in the State of Utah. Although the termination of formal education in pharmacy in Utah worked hardship upon the ressidents who were again forced to seek their didactic training in pharmacy outside the state, the profession stood to gain in the long run. The separation of pharmacy from the domination of medicine paved the way for the establishment in 1946 of a new College of Pharmacy, separate

and financially independent, an integral part of the university, on equal academic footing with every other college of the University of Utah.

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12. Records, Office of the Dean of Faculty, University of Utah.
13. University of Utah General Catalogue 1917-1918, pp. 107-9, 236-8 (1917).
14. University of Utah General Catalogue 1918-1919, pp. 94-8, 243-5 (1918)
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18. University of Utah General Catalogue 1922-1923, pp. 80-1, 183-5 (1922).
19. University of Utah General Catalogue 1923-1924, pp. 82-3, 187-9 (1923).
20. University of Utah General Catalogue 1924-1925, pp. 88-9, 197-200 (1924).
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26. News item, *Pacific Drug Review*, 34:86, July, 1922.
27. News item, *Pacific Drug Review*, 34:102, April, 1922.
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C. S. Rafinesque (1783 - 1840): a Challenge to the Historian of Pharmacy*

ALEX BERMAN
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It is as a naturalist that Rafinesque has made his most noteworthy (although not undisputed) contributions, but his versatility and wide range of activity extended into a large number of other fields, including pharmaceutical manufacturing, materia medica, and medicine.[1]

No definitive biographical and critical study of Rafinesque has yet appeared despite the increasing recognition of his stature, and the mounting literature on the man and his work. A comprehensive evaluation of Rafinesque's work and personality would require scholarship of a high order in many fields, historical acumen, and psychological insight.

In his autobiography, *Life of Travels* (1836), Rafinesque unabashedly informs his readers that:

Versatility of talents and of professions is not uncommon in America; but those which I have exhibited in these few pages, may appear to exceed belief; and yet it is a positive fact that in knowledge I have been a Botanist, Naturalist, Geologist, Geographer, Historian, Poet, Philosopher, Philologist, Economist, Philanthropist . . . By profession a Traveler, Merchant, Manufacturer, Collector, Improver, Professor, Teacher, Surveyor, Draftsman, Architect, Engineer, Pulmist, Author, Editor, Bookseller, Librarian, Secretary . . . and I hardly know myself what I may not become as yet; since whenever I apply myself to anything *which I like*, I never fail to succeed if depending in me alone, unless impeded and prevented by lack of means, or the hostility of the foes of mankind.[2]

It is manifestly impossible for any human being to be pre-eminent in all these fields, and Rafinesque was no exception. Much of what he wrote was undeniably amateurish and highly speculative, rendering him vulnerable to attack by his contemporaries. Rafinesque's uncontrollable compulsion to publish new genera and species was characterized by Asa Gray in 1841 as "a complete monomania."[3] Fellow scientists began to mistrust Rafinesque's judgment, and their

*Presented before the joint session of the Section on Historical Pharmacy of the A.Ph.A. and the American Institute of the History of Pharmacy at the meeting in 1951 at Buffalo, N. Y.

uneasiness was further increased by his bold questioning of the current concept of fixity of species as well as his advocacy of a natural system of classification at a time when artificial Linnean taxonomy was in vogue in the United States.[4] The elder Benjamin Silliman's attitude towards Rafinesque's writings probably reflects the attitude of many of the scientific editors of the time. A year after Rafinesque's death in 1840, Silliman, Sr., wrote:

It was in this year 1819 that I became alarmed by a flood of communications announcing new discoveries by C. S. Rafinesque, and being warned, both at home and abroad, against his claims, I returned him a large bundle of memoirs, prepared with his beautiful and exact chirography, and in the neatest form of scientific papers. This will account for the early disappearance of his communications from this Journal. The step was painful but necessary, for if there had been no other difficulty, he alone would have filled the Journal, had he been permitted to proceed.[5]

On the other hand, Dr. John Torrey, who knew Rafinesque well, stated about 1821 that Rafinesque was "the best *naturalist* I am acquainted with, but he is too fond of novelty."[6]

This ambivalent attitude of Rafinesque's contemporaries toward the man and his work is still prevalent today. E. D. Merrill, in speaking of the challenge of Rafinesque's work for present-day botanists, has remarked that "the same challenge exists in the United States in much of Rafinesque's work, and has existed for over a hundred years . . . It is admitted that some botanists have made serious attempts to evaluate and interpret many of Rafinesque's genera and species, but the fact remains that no individual has, as yet, accepted the challenge to accept the Rafinesquian nomenclatural problems *in toto*."[7]

Despite this attitude, many posthumous honors have been rendered Rafinesque. His remains have been transferred from an obscure grave in Philadelphia to Transylvania College, and a centennial celebration was held there in his honor in 1940. Rafinesque's personality and work have even inspired a long poem of over one hundred pages, written by J. Whaler in 1931, which has received favorable comments by literary critics.[8]

"Medical Flora" (1828-1830)

Rafinesque evinced an interest in plant medicinals early in life During his stay in Sicily, from 1805 to 1815, he had built up a

lucrative trade in crude plant drugs, exporting large amounts of squill to England, the United States, and Russia.[9]

In 1815, Rafinesque's journey from Palermo to Nem York proved a disastrous experience. His ship was wrecked off Long Island and Rafinesque, barely escaping with his life, lost all of his possessions. During the years that followed, Rafinesque taught botany and natural history at Transylvania University, traveled extensively in the United States, wrote for publication, conducted a voluminous correspondence, and worked on a multitude of projects, including a manual of medical botany. This manual finally appeared in two volumes, the first volume in 1828, and the second in 1830, entitled: *Medical Flora; or, Manual of the Medical Botany of the United States of North America.*

The *Medical Flora* represents Rafinesque's major contribution to American plant materia medica and, in his own words, was intended to be "a portable manual of Medical Botany for the use of Medical Students, Physicians, Druggists, Pharmacians, Chemists, Botanists, Florists, Herbalists Collectors of herbs heads of families, Infirmaries, etc."[10] In the introduction to volume one, Rafinesque scrupulously acknowledged his debt to a number of outstanding American physicians and appended a long list of authors consulted as references; for example: the two Bartons, Beck, Bigelow, Bartram, Chapman, Clayton, Coxe, Cutler, Drake, Ives, Andre Michaux, S. L. Mitchill, Pursh, Schoepf, Thatcher, Torrey and many others. Even Samuel Thomson and Peter Smith the Indian Doctor, are listed.[11] He mentioned his capacity to acquire knowledge from "the learned as well as the illiterate," and of never having "despised knowledge because imparted by an uncouth mouth."[12]

For the pharmacists and physicians of his time, Rafinesque had a great deal of importance to say. He pointed out that despite the rapid growth of medical schools, the establishment of many professorships in materia medica, and the excellence of a number of American medical botanists, the average medical practitioner was woefully lacking in a knowledge of medical botany. "Even in large cities," he wrote, "empirics are thriving, because they avail themselves of resources afforded by active plants, often neglected or unknown to the regular practitioners." He attacked the "Indian or Root Doctors, Steam Doctors, dealers in Nostrums, the Patent Doc-

tors," describing the empirics as "illiterate and ignorant, deceitful and reserved." Nor was he charitably disposed to the large class of regular physicians whom he characterized as "Theorists." In his own words: "The Theorists are often illiberal, intolerant, proud and conceited; they follow a peculiar theory and mode of practice, with little deviation . . . they are divided into many sects always at war among themselves and their rivals; such are the Brownists [and] Galenists." Only "Rational" practitioners met with his approval. In this group, he included what he termed the "Eclectics," whom he described as "those who select and adopt in practice whatever is found most beneficial, and change their prescriptions according to emergencies, circumstances, and acquired knowledge." There is no evidence that this designation was intended to apply to the followers of Wooster Beach. Later eclectic physicians simply appropriated this characterization and name as applying to their mode of practice.

Addressing himself to the pharmacist, he stated that "Even pharmacy is become a science, by the aid of Botany and Chemistry Druggists and pharmacians who sell vegetable Articles or Drugs ought to be botanically acquainted with them, so as to distinguish the genuine kinds, and detect frauds or blunders of the collectors and herbalists." Rafinesque directed the attention of the pharmacist to the widespread adulteration and substitution of imported vegetable drugs, citing cinchona and saffron as examples. "This arises," he stated, "from a want of medical inspection and official knowledge. The results are, that prescriptions fail, physicians are disappointed and patients suffer." He stressed the necessity of procuring fresh and genuine plant drugs from reliable dealers, and singled out the Shaker community gardens for special praise. "The best medical gardens in the United States," he wrote, "are those established by the Communities of Shakers . . . who cultivate and collect about one hundred and fifty kinds of medical plants . . . They sell them cheap, fresh and genuine, in a compact and portable form. Pharmacians would do well to supply themselves with them, or to imitate their useful industry." Furthermore, Rafinesque was convinced that a large export trade in American vegetable drugs could be built up. He wrote as follows:

Several of our medical plants and drugs are already an object of trade to Europe and elsewhere. Many more may become in demand, when their valuable properties will be better known. A new branch of

trade may thus be opened, which it is our duty to encourage, by collecting and cultivating our medical plants.

Finally, in the introduction to volume two of the *Medical Flora*, Rafinesque urges intensive research in plant chemistry on a par with the investigations of contemporary European scientists, praising especially the work of the Society of Pharmacists of Paris.

Despite its obvious merit, Rafinesque's *Medical Flora* was either ignored or adversely criticized by his contemporaries. The reasons for this have already been suggested, namely his unorthodox views, his eccentricity, and his reputation for being unreliable. Moreover, he had also antagonized the regular medical profession at this time by setting himself up in practice as a "pulmist," or a specialist in the treatment of consumption, without benefit of a license or an M.D. degree.

The harsh and even vindictive reception accorded the *Medical Flora* is clearly typified in two references. R. E. Griffith, M.D., editor of *The Journal of the Philadelphia College of Pharmacy* and lecturer on materia medica and pharmacy at the Philadelphia School of Medicine, writing on *Frasera Walteri* or American columbo, in 1832, had this to say about the *Medical Flora:*

In the Medical Flora of Mr. Rafinesque, a work we are induced to quote, from its containing much valuable information on our native plants; though unfortunately so mingled with wild hypotheses and unsubstantiated assertions, as to render it an unsafe guide; it is stated, "I suspect, that the analysis of the Frasera has not been accurate, and that it contains Inuline or a peculiar substance Fraserine intermediate between Inuline and Fraserine." As this suspicion of the author is based on no chemical analysis, it should have no weight with any future experimenter. For in science we should be extremely scrupulous in giving every discoverer the full credit for his researches, we should be as careful in disregarding the mere speculations of those who thus claim by anticipation a reward which is only due the real laborer in the domain of knowledge. This grasping at fame, and this eagerness to describe as new, subjects or articles that have never been investigated, or perhaps even seen by the person who thus gives them "a habitation and a name," is the bane of science, and should be treated with the contempt it so justly deserves."[12]

In 1852, some twelve years after Rafinesque's death, A. Clapp, M.D., published in Philadelphia a book entitled *A Synopsis; or Systematic Catalogue of the Medicinal Plants of the United States.* Clapp's opinion of the author of the *Medical Flora* was as follows:

Rafinesque, an ingenious but injudicious botanist (who created many new species out of the slightest variation of plants, which have not received the sanction of other botanists), was not a physician, and is not entitled to much confidence in regard to the properties of plants, when unsupported by other authorities; yet, as his account of them in his *Medical Flora* was mostly compiled from preceding writers—mostly from Schoepf, Thatcher, Bigelow, Ives and the two Bartons—it is therefore worthy of more credit that it could otherwise claim.[14]

Rafinesque and the Eclectic Medical Movement

During his lifetime, C. S. Rafinesque had indicated his disapproval of the many illiterate or semi-literate "root," "Indian," "Botanic," and "Thomsonian" physicians who practiced throughout the country. The rise of better educated and more scientific botanic practitioners under the leadership of Wooster Beach met with Rafinesque's approval. The movement founded by Beach, about 1829, was first called the "reformed system of medicine," and later was referred to as the "eclectic system of medicine," the term "eclectic" probably being borrowed from Rafinesque's definition, in his *Medical Flora*.

Of the correspondence which Rafinesque may have carried on with Beach and his followers, little is known beyond the excerpt from a letter to Beach, written by Rafinesque in 1840, the year of his death. This excerpt reads as follows:

I must now state again that I think highly of your Medical work: I belong, like yourself, to the Reformed School of Medicine, and agree with you much better than with Thomsonian, Homeopathic, and Botanical Empirics. Your system is a good one, if not perfect: it is better, at any rate, than most of the fashionable systems, Galenian, Brunonian, or mineral. Your system of surgery appears benign and safe, and much better than the old butchering system.[15]

This letter clearly indicates that Rafinesque preferred Beach's medical practice to any other medical system then in vogue. Furthermore, there is a possibility that other unpublished correspondence and manuscripts of Rafinesque pertaining to the eclectic medical movement may some day come to light.

After Rafinesque's death, the plates of the plant illustrations of the *Medical Flora* were purchased by Dr. Thomas Cooke of Philadelphia, an early eclectic physician, who published Rafinesque's illustrations in his journal, *The Botanic Medical Reformer* (1841). Subsequently, these plates came into the possession of Wooster

Beach, who used them to illustrate later editions of his *American Practice of Medicine.*[16]

A preliminary survey of eclectic literature shows scant reference to Rafinesque—not enough to conclude that he was considered a theoretician of the movement by early eclectic leaders. Not until the end of the nineteenth century is Rafinesque suddenly re-discovered and elevated to the position of one of the "fathers" of the eclectic movement by Wilder, Felter and others.[17]

There are some grounds for believing that the sudden interest and appreciation of Rafinesque in the nineties by Wilder and other spokesmen for the eclectic movement sprang partly from a belated recognition of Rafinesque's stature, and partly from propaganda purposes, to bolster up a declining movement. Rafinesque definitely has a place in the nineteenth century botanical revolt against the therapeutics of the regular physicians, but it may well be that Wilder has somewhat distorted Rafineesque's connection with the eclectic school. Further investigation is needed to clear up this point.

Rafinesque as a "Pulmist" and Manufacturer of "Pulmel"

In November of 1827, under the pseudonym of "Medicus," Rafinesque began a series of advertisements in *The Saturday Evening Post* of Philadelphia, in which he announced to the public his discovery of "Pulmel" as a "cure" for consumption. Two years later, in 1829, Rafinesque published a brochure under his own name, entitled: "The Pulmist, or the Art to Cure and Prevent Consumption." This work was subsequently translated into French and published in Paris in 1833.

In his introduction, Rafinesque stated that when he was ill with consumption, he had treated himself with his own methods and had recovered. "My previous skill in practical and medical botany," he wrote, "enabled me to discover . . . the probable effect of some active medical plants; and by their mixture . . . I restored myself to perfect health . . ." He also informed his readers that he was "prepared to contend with a host of prejudices and the established routine of the faculty," and he justified the secret composition of his remedies on the ground that "anyone has a right to withhold for a time the results of his experience, until he is remunerated . . ." As far as can be learned, the precise nature of his medication, which

he called "Pulmel" was never divulged. The greater part of the *Pulmist* is devoted to a discussion of the history of consumption, the geographical incidence of the disease, susceptibility, diagnosis, prognosis, theories of causation and methods of treatment.

"Pulmel" was described by Rafinesque as follows:

It is a peculiar compound substance, formed by the chemical combination of several powerful vegetable principles, acting on the lungs and the whole system. It contains no pernicious nor poisonous substance. The taste and smell are fragrant, and balsamic.[18]

Rafinesque manufactured and sold "Pulmel" in the form of a *Syrup* for internal use; a *Balsam* for inhalation; a *Lotion* to be used as a wash; a *Wine;* as *Lozenges;* as a *chocolate drink;* in the form of *powders* and also incorporated in *sugar* and *honey*. In addition, he offered for sale "Pulmelin," which he described as "a concentrated salt of pulmel."

On the back cover of "The Pulmist," Rafinesque advertised his consultation fees. He charged ten dollars for a consultation by mail, and five dollars for a personal visit. Interestingly enough, he indicated that people desiring his consultations might leave word at the establishments of Durand and Carpenter, two outstanding Philadelphia pharmacists. "Invitations to attend," he wrote, "may be left at the chemical stores of Mr. Durand, S.W. corner of Chestnut and Sixth; and Mr. Carpenter, near the N.E. corner of Market and Eighth; or the agents for the Pulmel, or in the Post Office."

There is in existence an original manuscript of a medical consultation by Rafinesque, in the possession of the New York Public Library. This "medical consultation" has been edited and annotated by Mabel Clare Weaks, and has been published in the *Bulletin of the History of Medicine*, vol. 18, 1945. It is the opinion of Miss Weaks that "the 'consultation' shows that the treatment recommended by Rafinesque was in advance of his period. While his famous contemporary, Dr. Pierre Charles Alexander Louis of Paris, France, was treating phthisis or consumption by venesection, blistering, and application of leeches, Rafinesque discouraged blood-letting, advised the building up of the general health and making of pure blood by a good diet, including milk, fruit, and green vegetables . . . "[19] Without attempting to condone Rafinesque's venture into medical and pharmaceutical practice, it is safe to say that his therapeutics

compared favorably with the prevailing treatment offered by the regular physicians.

As might be expected, the regular practitioners reacted very strongly against Rafinesque's intrusion into their field. Dr. Daniel Drake, writing in the *Western Journal*, in 1829, denounced Rafinesgue as a quack and classed him with Samuel Thomson, William Salmon, William Swaim, and Samuel Robinson. Dr. Drake, declaiming in verse, wrote:

> **"Then thick as locusts darkening all the ground,**
> **A tribe, with herbs and roots fantastic crown'd,**
> **All with some wond'rous gift approach the people,**
> **Lobelia, pulmel, and steam kettle."**[2]

What Dr. Drake neglected to mention was that the people were turning to men like Samuel Thomson and C. S. Rafinesque because of the shortcomings of the American medical profession during that time.

Rafinesque deserves consideration by historians of pharmacy and medicine as a challenging figure in the context of the nineteenth century botanico-medical movement. This paper has been presented as a preliminary study, but further research into the sources, especially Rafinesque's unpublished manuscripts and letters, will be required before venturing any final appraisals.

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Undergraduate Chemical Training of the Pharmacist Entering the Pharmaceutical Industry

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The pharmaceutical and allied chemical industries engaged in the research, development and manufacture of medicinal drugs and chemicals offers a number of opportunities for the graduate in pharmacy. The pharmacy graduate, with his training in the art of pharmacy, and with an adequate and practical knowledge of pharmaceutical chemistry, should be particularly well fitted to engage in some phase of industrial pharmacy and thus to create and maintain a demand for his services in the industry.

Pharmacy, in all of its ramifications, is a tremendously broad field and capable of almost infinite specialization. It utilizes the skills and technics of nearly every field of science, particularly so those developed in the various branches of chemistry. Medicinal agents are derived from many sources and the isolation, purification, formulation, manufacture, control and marketing of each of these new drugs has required the technological skills of men trained in many fields of specialization.

The tremendous strides made during the past few years in chemotherapy in the isolation and synthesis of new medicinal agents is obvious to all. One merely needs to review the contents of past revisions of the United States Pharmacopeia and National Formulary to see the steady and rapid increase in the number of synthetic chemicals and active constituents of natural products which have either been isolated in pure form or made by purely synthetic methods. Drug therapy has been undergoing radical changes with new and powerful chemical drugs being developed at a rate never before equaled. With intensive research continuing and expanding in university and industrial laboratories, future contributions of synthetic chemistry to the physicians armamentarium will doubtless far overshadow the amazing discoveries of the past.

With this present day emphasis on more and more chemical and allied research into the prevention and treatment of human diseases and the discovery and perfecting of new and improved chemical products to combat disease, the undergraduate chemical training of the pharmacist assumes greater and greater importance regardless of the particular phase of pharmacy he engages in upon graduation. For the pharmacist entering the drug industry his chemical training is of particular importance for there is hardly a step in the research, development and manufacture of drugs that chemistry does not play a part.

For the schools of pharmacy to meet this increasing need for more chemical training may impose somewhat of a problem. Perhaps the answer lies in extending the number of years required for the pharmacists training. It would appear, however, that a great deal could be accomplished by permitting much greater flexibility in the curriculum of the regular four year program in order to enable the student to acquire the particular training best suited for his future needs. You cannot, in four, five or more years, train a man to be a jack of all pharmaceutical trades. There must be some degree of selectivity and specialization and this should better be permitted as much as possible at the undergraduate level. It would greatly reduce the time required for training in industry of the pharmacist and thus increase his value to his employer. Some pharmacy schools, not inclined to increasing the number of years required for a pharmaceutical education, compress all their students to a common mold and conclude that all specialization must, of necessity, be acquired in graduate training. A four year course in pharmacy should provide ample time to prepare the student for the present day practice of pharmacy and, by adequate curriculum flexibility, still permit the individual not interested in retail drug store operation to train himself in some other of the many phases of the profession.

There are a number of positions in the pharmaceutical industry for which the pharmacist might qualify. There is a need for organic chemists, analytical chemists, research and development pharmacists, manufacturing operators, technical service men, salesmen and medical representatives. Yet, I believe you will find that many of these positions are held, not by pharmacists, but by chemists and others with no

pharmaceutical training or background whatsoever. Some of these men have advanced to their present positions through what amounts to an apprenticeship system. I have known some chemists who have developed into first rate pharmacists, and occasionally encountered a pharmacist who makes a pretty good, practical chemist. It is perhaps a challenging question why the pharmaceutical industry does not employ more graduate pharmacists if for no other reason than to take advantage of their valuable pharmaceutical background.

Let us follow the various stages in the research, development and manufacture of a new medicinal product and see wherein the graduate pharmacist might contribute and what his preparatory training and qualifications should be.

Pharmaceutical industry chemical research laboratories are intensively engaged in research programs in varied types of medicinal agents, such as antimalarials, antihistaminics, antibiotics, antispasmodics, and many others. Valuable new drugs are not acquired over night, but usually represent the expenditure of months and years in intensive and painstaking research. Definite leads as to the course or pattern these programs will follow usually exists, but nevertheless many series of compounds must be explored and hundreds of chemicals must be synthesized, purified and subjected to pharmacological screening in order to attain a single new medicinal chemical of therapeutic value. For each new drug of promise which emerges from the laboratory there are hundred that fall by the wayside and only their epitaphs remain in the chemical literature as interesting examples of the skill of the chemist.

The setting up and direction of these chemical research programs requires the special skills and experience of thoroughly trained biochemists and organic chemists under the guiding hand of an able research director. However, once the general pattern of research has been established and one or more members of a chemical series have been prepared, the greater bulk of more or less routine synthetic work in completing the series can, with proper supervision, be assigned to less highly trained chemists, thus releasing the research chemist for further exploratory studies. It would appear reasonable that the graduate pharmacist whose training in organic chemistry has been supplemented by the acquisition of laboratory skills and technics should be able to handle this kind of work, yet relatively

few graduate pharmacists are found in such laboratories. The laboratory tools and methods employed by the organic chemist to attain the desired style of molecular architecture are not too varied. Ordinarily the chemist can, with modification, apply basic methods to the synthesis of a variety of chemical compounds. The worth of the chemist lies in his knowledge of chemical processes and his skill and dexterity in applying them to the particular problem at hand. Laboratory training in organic chemistry should be designed to improve the students understanding of ordinary laboratory manipulations and to widen his knowledge of the apparatus at his command. He should be trained in the care, assembly, use and limitations of the various types of equipment commonly employed in the laboratory. Emphasis should be placed on the need for applying all adequate precautions as to safety. No one wants in his laboratory an individual who supplies simply another pair of inept hands that requires constant supervision and vigilance to avoid physical injury and damage or loss of material and equipment.

Completion of the chemical reaction is only the first phase of the chemical problem for there still remains the task of isolating, purifying and characterizing the new chemical. Here, certainly, the methods and technics are less numerous, more standardized and their application depends essentially upon the chemical and physical properties of the compound. A most valuable sort of training for this type of work would be a course in organic laboratory technics which covered in detail such operations as fractional distillation, steam and vacuum distillation, fractional crystallization, filtration, adsorption, extraction, and special micro methods of isolation and purification. Such a course should properly follow or accompany an advanced course in organic chemistry, provided there is sufficient room in the curriculum for election of the latter course by the student planning to enter industry. No doubt there are courses now existent in the curriculum which could be so substituted with very considerable benefit. And while we are demolishing the curriculum why not include a laboratory course in qualitative organic analysis. This course might masquerade under the more glamorous title of a course in the detection of poisons, but in either case it could be made a most effective means of driving home a great deal of chemical theory and the attainment of a high order of laboratory skill.

Training in quantitative organic analysis, while valuable and contributing greatly to the operators accuracy and manipulative skill, would appear to be less essential since in most laboratories such specialized work is handled by trained micro-analysts.

Out of the countless new chemical compounds prepared and screened by the research laboratories, a few may emerge of sufficient promise as to warrant further investigation. After the new drug has satisfactorily passed thorough pharmacological tests which have demonstrated a low order of toxicity and a high therapeutic index, it must be made ready for clinical trials. We may now take leave of the research division for it is at this point that the project is usually turned over to chemical development for synthesis of the larger quantities of drug required for compounding and testing.

The chemical development laboratory receives from the research division all information they have acquired regarding the preparation and properties of the new drug. The chemical researcher has usually prepared only a few grams of the chemical and, properly so, has not been too much concerned regarding yields and costs of preparation. It is up to development to seek cheap raw materials, maximum reaction yields and a minimum of equipment and ease in handling, all leading ultimately to expansion of the process to plant scale. A great deal of bench scale investigation is required before expansion of the process can begin. To expand a process by simple multiplication is to invite disaster and an ultimate return to small scale operation to find out why the whole thing didn't work. Multistage processes must be broken down and each reaction step studied to find the optimum conditions for maximum yields and to determine handling characteristics.

Chemical development calls for the services of good, practical organic chemists and engineers who can apply a high degree of ingenuity and technical skill to the productive prosecution of the project The research minded chemist is, perhaps, less well fitted for this work, since he is more inclined to pursue a devious path with frequent detours to investigate interesting but frequently irrelevant phenomena encountered along the way. There should be a spot in chemical development for the graduate pharmacist possessed of good chemical training to perform many of the routine processes and reaction studies required in the initial stages of development. Again,

it is essential that the operator be familiar with chemical operations and able to find his way around the laboratory. Graduate chemists are sometimes encountered who, although saturated with chemical theory, cannot properly determine a melting or boiling point, nor assemble and use even relatively simple chemical equipment. Perhaps it will be argued that the graduate pharmacist is never going to perform such operations anyway, hence his training in such things is quite unessential. However, the graduate pharmacist who enters industry will need all the operational skills he can acquire and such training should certainly not be slighted. Lack of equipment, time, or inadequate laboratory facilities may force the instructor to set up the apparatus the day before and merely demonstrate the process to his students. The only way the student is going to learn how to assemble and use equipment is by doing these things for himself and doing them often. Laboratory manuals frequently provide such detailed instructions on how to carry out the prescribed experiment as to leave little opportunity for the student to call upon his own ingenuity. Before the student turns in his experimental chemical product he should be required to purify it to certain specified standards. Provide the student with chemical mixtures and let him see what he can do in devising means of identification, and separation with maximum return and quality of the components. Permit the student to select a few experiments of his own and encourage him to draw upon the chemical literature and his own ingenuity in conducting the experiment. The good development chemist seldom performs an experiment without learning in the process some better way of doing it, and this frequently leads to highly desirable time and cost saving short cuts or improved yield of product.

After the chemical development laboratory has supplied larger quantities of the new drug, the next phase is the pharmaceutical formulation or compounding of the drug in suitable forms. The pharmaceutical research and development laboratory is now concerned with a study of the physical and pharmaceutical properties of the drug, compounding it in stable form, and developing a process of pharmaceutical manufacture. Pharmaceutical development involves the solution of a veritable host of problems before the new product can be turned over to the manufacturing unit. A number of formulations must be put together and tested for clinical effec-

tiveness and customer acceptance, stability data must be collected, the best type of container determined, pilot manufacturing and packaging trials conducted to determine machine characteristics, and finally joint manufacturing trials with the production unit to instruct their personnel and to collaborate with the unit in setting up the new process for smooth operation. It is in pharmaceutical research and development that pharmaceutical training is most essential. Thorough training in the chemical and physical properties of drugs and the methods of blending or compounding them is most valuable. To develop new formulations, to acquire technical data, and to trouble shoot on manufacturing problems calls heavily upon the development pharmacists knowledge of inorganic and organic pharmaceutical chemistry, of manipulative or operative pharmacy, of prescription compounding, instrumentation, pharmaceutical calculations, and manufacturing pharmacy. Pharmaceutical development is a most interesting and challenging field and requires all the resourcefulness and ingenuity the technician can bring to bear to solve the varied and numerous problems which constantly arise. The caliber of the man can be judged by the size of the hurdle which stops him, and with production schedules and delivery dates to be met the solution of developmental and manufacturing problems must be prompt.

Before a new product can be placed on the market it must be demonstrated to possess sufficient stability to withstand normal shelf life so as to reach the consumer in good condition. Such storage testing under various conditions of all regular line products as well as experimental formulations is usually a function of development. The conduct of a storage and aging laboratory properly lies in the hands of trained pharmacists. This work calls for keen observation, accurate measurements and detailed reporting, since the data so collected frequently points the way to needed improvements in formula, container, or manufacturing process.

With the addition of a new item to the manufacturing list there arises the need for quality control of raw material, the manufacturing process and the finished product. Control laboratories require the services of bacteriologists, micro-biologists, pharmacologists, and chemists or pharmacists trained in analytical procedures both chemical and physical. There has been a marked increase in the use of instruments to acquire rapid proof of identity and purity of

drugs and chemicals. A great deal of this instrumentation has come from research in physical chemistry which has been applied to the special problems arising in pharmaceutical or chemical operations. A practical laboratory course in instrumentation would vastly improve the chances of the graduate pharmacist getting a job in quality control. He need not be overly burdened with the construction and theoretical principles involved in such instruments, but he should be carefully trained in their operation and applications. Manual dexterity, operational technic and accuracy are necessary attributes of the analyst. Although analytical work may be repetitious and tedious it is an excellent means of gaining valuable experience and a good insight into the over-all operations of the pharmaceutical industry.

There are a number of opportunities for trained pharmacists in the various manufacturing units, and as medical representatives or members of sales divisions. To those engaging in these phases of industrial pharmacy a sound chemical background would be a valuable asset. A number of pharmacy schools are now offering educational programs leading essentially to a degree in pharmaceutical engineering. This is a very commendable effort on the part of the schools to meet the demand of the pharmaceutical industry for men with pharmaceutical manufacturing and engineering training.

The pharmacist entering industry would be the better prepared for having elected at least a beginning course in biochemistry. A non-mathematical treatment of physical chemistry with physics as a prerequisite would be helpful. A little more emphasis on mathematics would do no harm since the arithmetical skill of graduate pharmacists is sometimes rather inadequate. Mistakes in calculation can vitiate whole experiments and can be extremely costly when committed in the manufacturing units. A good stiff course in chemical and pharmaceutical calculations is suggested, including instruction in the use of logarithms, the slide rule and calculating machines.

Most pharmaceutical curricula contain courses in library practice and should, with chemical and pharmaceutical applications, be required of all students. Familiarity with the chemical and pharmaceutical literature can prove to be a valuable asset, for no research or development problem should be started without a prior literature search to avoid repetitious work and loss of valuable time. The student should be encouraged to acquire a working library of his own.

The advantages of membership in the American Pharmaceutical Association and other scientific societies should be emphasized.

In closing, may I again review the types of jobs offered by the pharmaceutical industry, jobs which in many cases could best be filled by qualified pharmacists, such as assistant organic chemists, technicians, analytical chemists, research and development pharmacists, manufacturing operators, technical service men, and as sales and medical representatives. The man possessing a B.S. degree in pharmacy which accurately indicates he has acquired, in addition to his pharmacy, a good basic training in chemistry, should be quite well qualified to engage in many phases of industrial pharmacy with profit to himself and to his employer. Unfortunately, there are probably more men employed in the drug industry with B.S. degrees in fields other than pharmacy than there are pharmacists. Such imbalance might be corrected to a considerable degree by providing sufficient flexibility in the pharmacy curriculum to permit the student who elects some phase of industrial pharmacy to select those courses best designed for his needs. The fundamental theme in designing the students scholastic program should be guided by the fact that the graduate pharmacist enters the pharmaceutical industry not as a specialist, but as a technician, and as such should be thoroughly familiar with the tools of his trade.

The Board of Grants of the American Foundation for Pharmaceutical Education, on June 13, 1952, awarded 26 new graduate Fellowships and Teaching Fellowships, five of them being Teaching Fellowships in Business Administration. The new recipients will pursue graduate study in 16 universities.

The Board also renewed Fellowship grants to 16 other graduate students. An additional 37 Fellows are currently holding grants. The 99 Foundation Fellows and Teaching Fellows are studying pharmacy, related subjects, or business administration in 26 universities.

The Board also authorized undergraduate scholarship awards, for top ranking junior and senior students. These scholarships are available to every accredited college of pharmacy.

Pharmacy as a Member of the Healing Arts*

ROBERT P. FISCHELIS, Phar.D., Sc.D.
Secretary, American Pharmaceutical Association

Mr. Chairman, Mr. President, Members of the Board of Directors and Faculty, Alumni, Students and Friends of the College of Pharmacy of Butler University:

The American Pharmaceutical Association is glad to join you on this happy occasion and I am greatly pleased as its executive officer to be the medium through which we are enabled to participate officially in these exercises and to convey to you our congratulations and best wishes.

As those of you who are members of the American Pharmaceutical Association know, this is the centennial year in our history. So far as I know, the group of 24 pharmacists, or "pharmaceutists", as they were referred to in earlier days, who met in Philadelphia in 1852 did not include a representative from Indiana. However, Hoosier pharmacists and many outstanding teachers in Colleges of Pharmacy in Indiana have played an increasingly important part in the development of American Pharmacy at national, state and local levels. Your own institution numbers, among its faculty, men who have made outstanding contributions to the progress of our profession and who have held important Committee assignments and high office in the American Pharmaceutical Association.

Your institution is located in a veritable beehive of pharmaceutical activity. Not only do you have intimate contact with the esablishments that serve as community centers for the distribution of drugs, medicines, medical supplies and health information directly to the public, but you are also in the center of a district which is looked to for extensive warehousing and wholesale supply of the essentials for good medical care for a wide area. And, of course, the pharmaceutical research and production emanating from such world famous organizations as the Lilly Laboratories located in this city, have added to the span of life and comfort of millions.

Indianapolis therefore seems a natural professional environment for a College of Pharmacy and when this is coupled with edu-

*An address at the Dedication Exercises for the new Pharmacy Building of Butler University, at Indianapolis, Indiana, May 7, 1952.

cational and spiritual surroundings such as are supplied by this great University, Pharmacy's cup in Indianapolis is indeed filled to overflowing.

In his book "The Hero in History," Sidney Hook made an interesting distinction between two kinds of history makers, the *eventful* man and the *event-making* man. The eventful man makes history by being in the right place at the right time and doing the right thing.

Dr. Elliott, Dr. Briggs and I are just now at the right place at the right time doing or saying, we hope, the right things.

The event-making man, on the other hand, changes the odds of neutral history by his own impact on it.

The event-making men of this occasion are well known to you. They are the men who by their will, their determination, their perseverance and their courage have made things happen. They made history when they organized the Indianapolis College of Pharmacy. They continued to make history when they sought and found a university from which they could receive help in placing their program of professional education on a sound cultural foundation. They continued their event-making when they succeeded in merging the Indianapolis College of Pharmacy with Butler University and then launched upon the drive for funds with which to erect and equip this building. Again did they make history when they refused to be discouraged as they learned that funds originally provided would no longer build the kind of institution they had visualized and proceeded to make up the deficit.

I am sure these event-making men are aware that their task is not yet finished. In fact it will never be finished because, as Chancellor Heald of New York University has so well said:

"Higher education is called upon today to do its job better and quicker than ever before. Like the nation itself, education is confronted with responsibilities more extensive in scope, more pressing in point of time, and more profound in their implications for the nation than it has ever been faced with in our history. How it measures up to this challenge may well determine our future as a nation.

"Higher education performs two major functions: it teaches the nation's youth—those who want to be taught and who are able to learn—and it engages in basic research to uncover new truths and extend man's knowledge and broaden his understanding. These are simple

enough objectives, but they become exceedingly complex when there are
too few people to be taught
too few people to do the teaching and research
too little money to supply the student, teacher, and researcher the facilities they need
too little understanding of the aims and problems of the whole edutional process
and too little awareness of the role of education in international affairs."

The event-making men of this occasion have provided facilities which, with proper leadership and the combined efforts of faculty, alumni and student body will make this institution the living, pulsating instrument for conditioning the minds of young men and women to absorb the foundational and professioal knowledge necessary to the practice of the healing arts in an age of unprecedented scientific advance and consequent need for specialization.

Now what are these healing arts and just where does pharmacy fit into the pattern of healing the sick in this age of so-called miracle drugs, surgical skills and healing devices?

I have always been intrigued by the difference between legal and scientific definitions of the same terms. The best definition of the term "drug" I have seen in any work of pharmacology reads: "any substance which affects human protoplasm." Compare this broad all-inclusive definition with the involved definition given in the Federal Food Drug and Cosmetic Act and you will know what I mean. The law states:

"The term drug means (1) articles recognized in the official United States Pharmacopoeia, official Homeopathic Pharmacopoeia of the United States, or official National Formulary or any supplement to any of them and (2) articles intended for use in the diagnosis, cure, mitigation, treatment or prevention of disease in man or other animals, and (3) articles (other than food) intended to affect the structure or any function of the body of man or other animals, and (4) articles intended for use as a component of any articles specified in clause 1, 2 or 3 but does not include devices or their components, parts or accessories."

In the first instance we state in a very few words the whole philosophy of education in the healing arts. In the second we have the policeman's definition because the wording must be sufficiently inclusive and exclusive to serve the purpose of apprehending those who may transgress the law.

Recently it became necessary to provide a legal definition for the healing arts in connection with student deferment under the Selective Service Law. This definition reads:

"A student of one of the healing arts is a student who is pursuing a course of instruction in a professional school of (1) Medicine, (2) Dentistry, (3) Veterinary Medicine, (4) Optometry, (5) Osteopathy, (6) Pharmacy, (7) Chiropractic, or (8) Chiropody."

I am sure that neither dictionary nor legal definitions of terms dealing with the healing arts would satisfy the concept which the professions engaged in conserving the health of people have set for themselves in defining their functions or limiting their services.

Members of the healing arts look upon themselves as humanitarians rather than impersonal technocrats. They incline to the principles set forth in the constitution of the World Health Organization in which health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. They believe, as this constitution further states, that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition; and they believe further that the health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest cooperation of individuals and states.

In essence, then, the obligations of members of the healing arts are not merely technical or professional, but they include social obligations which bind this group together in the overwhelming desire to bring to all people the advantages of progress in the art and science of medicine as quickly and as economically as possible.

Today you are dedicating this building to the advancement of one member of the healing arts and, therefore, you are dedicating it to the advancement of the healing arts as a whole. I like the word dedication. It signifies a spiritual quality essential in the training and preparation for the practice of the healing arts. It carries the connotation of service. It answers the question, "Am I my brother's keeper?" It signifies acceptance of responsibility beyond the call of duty. It emphasizes the difference between giving and receiving. It infuses warmth and depth of feeling into such cold and calculating sciences as mathematics, physics, chemistry, which are the founda-

tions of the arts and sciences that constitute our professional curriculum.

We are dedicating a building wrought by the hand of man but inspired by the concept of service "to the least of these, our brethren" enunciated by the Great Physician himself in Holy Writ. But unless the ceremony dedicating this magnificent building and equipment to the healing arts and, especially, to pharmacy is symbolic of the dedication of the lives of the men and women who labor here as teachers, administrators, research workers and students to the advancement of pharmacy as a member of the healing arts, those who have made possible these fine facilities will have labored in vain.

I am sure, as I recall the services of the many active workers in American pharmacy who have contributed to the fulfillment of this objective, that we can look forward to splendid contributions from those who labor within these walls, and as I close, I feel that I would be remiss if I did not pay a tribute to the man who, in the minds of most of us who are some distance removed from Indianapolis, has been looked upon as the personification of your institution at our national meetings and in our contacts with the College of Pharmacy.

Dean Niles, I am referring to you, and I am sure that for you, perhaps more than for any one else in this gathering, the dedication of this building is the fulfillment of a dream. We join you and your associates in wishing you well and saying, "Well done, faithful servant."

The American Pharmaceutical Association Women's Auxiliary Awards.—The Auxiliary has announced 63 Centennial Awards to be presented to a senior woman pharmacy student in each of the member colleges of the American Association of Colleges of Pharmacy accredited by the American Council on Pharmaceutical Education. The award consists of one year of active membership in the American Pharmaceutical Association.

The Conference of Teachers of Pharmacy Administration*

CHAUNCEY I. COOPER
Howard University

Throughout time man and his institutions have been criticized, and out of this criticism, constructive and otherwise, better systems and methods have been developed. Yet, despite the improvements that have been made in the area of commercial pharmaceutical education (pharmacy administration), criticism will continue, and justly so. When criticism ceases, the process of improvement will likewise cease and our eduuational process will go into decline.

It is indeed encouraging to see that this conference has developed rapidly over the last few years and that the second seminar on instruction should be offered in the field of Pharmaceutical Administration. Suffice it to say, Pharmacy Administration has become of age, and its importance in the pharmacy curriculum is now as well established as that of the other several areas of instruction.

When we recall that a few years ago we literally begged for papers and participants and received little or no support, and then today see the six papers scheduled for delivery, one cannot but feel encouraged.

The published proceedings of the Seminar in Pharmacy Administration held at the Ohio State University June 19th to 30th, 1950 is eloquent testimony to our accomplishment in this area. A report covering this seminar is scheduled later in the program of this session.

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*The Chairman's address before Section on Pharmacy Administration of the Conference of Teachers at the 1951 meeting in Buffalo.

With six papers to be heard here today I must be brief in my remarks; however, I cannot resist delving into the past, to see what was said the last time we met in Buffalo. In reading through the Proceedings of the American Conference of Pharmaceutical Faculties, I found that in his presidential address Dean Charles W. Johnson of the University of Washington made the following statement here in Buffalo, Hotel Statler, August 25, 1924:

"We must not lose sight however of the fact that pharmacy colleges exist for the primary purpose of training men for present day retail pharmacy. We must recognize that retail pharmacy is both a science and a business. We must train men in the first place who will safely, accurately and with understanding be able to prepare and dispense medicines. When that is done we should next train him in business methods so that he may be a financial success as well as a professional success. In most of the large universities there have in recent times been organized colleges of business administration. If you will look at the enrollment of these colleges you will be interested to learn of the number of men and women eager to learn of the profession of business. Ask the dean of any college of business administration and he will tell you that business is a profession. If this is true then pharmacy should not be backward in recognizing it. You will find ten times as many students enrolled in colleges of business administration as are enrolled in pharmacy. If modern retail pharmacy demands both scientific and business training the colleges of pharmacy should be ready to recognize it and arrange curricular to meet the conditions."

Then on the next day of the meeting, August 26th, the following resolution was approved:

"The President next recommends that our schools make full use of the courses given in colleges of business administration in so far as they can be applied to retail pharmacy, and arrange four year curricula to

meet present day problems of retail pharmacy. This recommendation is approved in principle."

Thus, twenty-seven (*27*) years later we return to Buffalo with this resolution almost a complete reality.

The term 'almost' is used because in reviewing many of our catalogues our statements and requirements are somewhat vague and indefinite; however, Pharmacy Administration, the youngest of our new additions, has made remarkable progress within the last four years in all of our colleges.

Through the continued support and contributions of persons like Drs. Paul Olsen and Stephen Wilson, Profs. Joseph H. Goodness and B. Olive Cole, this conference has grown and done much to enrich this area of instruction and stimulate the younger teachers. With the Proceedings of the Seminar in Pharmacy Administration as a further guide, and the supporting evidence available in The Pharmaceutical Survey, the future is quite clear as to the course we must follow and the responsibility that lies ahead.

In conclusion, I wish to thank you for this honor of serving as your Chairman for two successive years and offer the following recommendations:

1. **That the Teachers Conference on Pharmacy Administration organize, sponsor, and support a 'work shop' type of program covering at least one area of Pharmacy Administration at the 1952 meeting.**

2. **That the Teachers Conference on Pharmacy Administration give consideration to the matter of developing a modern syllabus for use in the teaching of pharmacy accounting, drug marketing, pharmacy management and pharmaceutical law.**

Requirement of Reasonable Accuracies in Prescription Compounding Laboratory*

LEO A. SCIUCHETTI, SHIRLEY F. ROEDER AND GEORGE E. CROSSEN
Oregon State College

It is redundant to state that the primary function of the pharmacist, whether he be practicing in a professional pharmacy or in the average drug store, is the accurate compounding and dispensing of those prescriptions entrusted to him. Yet several authors have published articles in our professional literature indicating that this primary requisite is often sadly lacking, apparently sacrificed to urgency, speed or just plain carelessness. It is to be wondered how much of this apparent carelessness can be attributed to attitudes acquired and practices learned during the period of undergraduate training of the pharmacist; attitudes and practices for which we, the teachers of pharmacy, must admit our full share of responsibility.

Andrews [1-5] published a series of articles on the kinds of errors and the extent to which they occurred in prescription compounding. In one of these papers he points out the relation of the uncontrollable factors and the personal equation to inaccuracies in the filling of prescriptions. Goldstein[6], in a recent paper, gives a complete account of factors affecting accuracy in compounding. In his discourse, he gives little credence to the results presented in Andrews' series of articles because all of the compounding and at least some of the checking of the prescriptions used in that series of studies was done by undergraduate pharmacy students.

All of us who are presently or who have at any time in the past engaged in laboratory instruction in prescription compounding realize that it is extremely difficult to raise the mental attitude of the student above the immediate problem before him; to make him see that he is engaged in preparing a medicine for human consumption and not just performing a laboratory experiment for the purpose of completing course requirements. Yet this attitude is of extreme importance to his professional future, determining in large measure

*Read before the Section on Pharmacy of the Conferences of Teachers at the 1951 meeting in Buffalo.

whether or not he is a safe person to admit to the practice of pharmacy.

It is the belief of the authors that the importance of this attitude should be emphasized to the student all through his period of undergraduate training and especially during the courses in prescription compounding. It is our opinion that this cannot be done as long as quantity of work accomplished in the laboratory is considered as the major basis for measurement of the ability of the student, wi only superficial attention being given to the quality of the product prepared by him. All of us realize that speed in compounding should be the result of practice and of confidence in one's own ability, and should not be attained at the sacrifice of sound basic practices. How to bring the student to the recognition of this fact has been argued pro and con for many years, but one of the methods that can be depended upon to reach all of the students is that of gearing present and immediate success in the course directly to the quality of the materials prepared by each of them. True, this entails the expenditure of extra effort on the part of the instructor, but it is effort well spent, work which cannot help but eventually make its impression on those practicing our profession.

In an attempt to determine the extent to which accuracy was being neglected in favor of speed and quantity of compounding among our own senior students, a simple experiment was devised and carried through during the last school year. The following two prescriptions were selected for this study, both formulas being simple and easy of preparation and, at the same time, comparatively easy of analysis.

Rx 1.	Rx 2.
M.ft. collyr.	Argenti Nitratis 1%
Boric Acid 3%	Aqua Dest. q.s. 60
Aq. Camphorae	
Aq. Dest., aa	M.ft. sol.
qsad ..... 60.	

Each of these was given to the class under two sets of conditions, the first adverse and conducive to slipshod methods if the student were so inclined, and the second more ideal and with the warning that the product was to be analyzed. The second presentation of the same formula was so spaced that the student did not suspect any association of analytical results. Forty-nine students took part in

the experiment, each compounding both formulas under the conditions mentioned and each being checked against his own previous work rather than against a class average or median. The data obtained in this study are presented in Table 1, 2 and 3, where prescriptions A and B represent Rx 1, and C and D represents Rx 2. Announcement of pending analysis of the product was made before issuing B and D. All analyses were run by members of the staff of the department of pharmaceutical chemistry.

Table 1. Number of Deviations from Required Concentrations.*

Prescription Number	±5%	±10%	±12.5%	±15%
A	25	15	13	11
B	12	7	6	4
C	37	18	13	6
D	17	7	6	5

*The number of samples in all cases was 49.

Table 2. Number of Samples Falling Within Tolerances Listed.

Prescription Number	±5%	±10%	±12.5%	±15%	over ±15%
A	24 (48.9%)	34 (69.3%)	36 (73.4%)	38 (77.5%)	11 (22.4%)
B	37 (75.5%)	42 (85.8%)	43 (87.7%)	45 (91.8%)	4 (8.16%)
C	12 (24.4%)	31 (63.2%)	36 (73.4%)	43 (87.7%)	6 (12.2%)
D	32 (65.3%)	42 (85.7%)	43 (87.7%)	44 (89.7%)	5 (10.2%)

Table 3. Percentage Error of Individual Students on all Four Solutions.

Student Number	Percentage Error			
	Rx A	Rx B	Rx C	Rx D
1	+ 7.33	— 9.00	— 8.00	— 4.00
2	— 3.66	+ 0.33	—11.00	+ 3.00
3	+ 1.00	0.00	— 5.00	0.00
4	—66.66	— 4.00	— 9.00	+ 2.00
5	— 1.66	+ 0.33	—10.00	— 9.00
6	—14.00	— 2.33	+10.00	0.00
7	— 7.33	— 1.00	— 8.00	— 2.00
8	—28.33	+ 0.66	—17.00	+12.00
9	— 7.66	—13.33	—19.00	—31.00
10	— 4.33	— 3.33	—14.00	+ 4.00
11	+ 3.00	+ 5.33	—14.00	+ 4.00
12	+ 0.66	—19.33	— 2.00	—35.00
13	— 7.66	— 1.00	—14.00	+ 6.00
14	— 6.00	+ 2.66	+ 1.00	+ 4.00
15	0.00	— 2.66	—14.00	+ 7.00
16	— 4.66	+ 4.00	— 4.00	— 3.00
17	+ 1.33	— 7.33	— 5.00	— 3.00
18	—10.66	+ 3.66	—66.00	+ 3.00
19	— 2.33	+ 2.66	—14.00	+10.00
20	—13.00	— 4.66	— 6.00	+ 3.00
21	—15.33	0.00	+896.00	— 4.00
22	—23.66	— 1.33	— 4.00	— 3.00
23	+ 4.00	0.00	— 7.00	+ 4.00
24	— 2.00	+13.33	—11.00	+17.00
25	— 6.66	—15.33	—11.00	—35.00
26	+ 5.33	+ 3.33	— 7.00	+ 2.00
27	— 5.00	+20.00	— 7.00	0.00
28	— 2.33	+ 7.00	0.00	0.00
29	— 8.33	+ 4.00	— 8.00	—35.00
30	+ 1.00	+ 3.33	+ 1.00	+ 8.00
31	— 0.33	+ 2.33	— 6.00	+ 6.00
32	+ 2.66	— 4.00	—12.00	+15.00
33	—21.00	— 6.66	—30.00	— 2.00
34	—76.33	— 4.00	— 7.00	+ 1.00
35	— 9.00	— 4.00	— 4.00	+ 4.00
36	+ 1.00	0.00	+ 9.00	+ 5.00
37	— 3.33	— 4.66	+ 9.00	— 4.00
38	— 1.66	—20.00	—12.00	0.00
39	—54.33	+ 2.00	+14.00	+ 7.00

40	—24.66	+ 4.66	— 6.00	+ 5.00
41	—38.66	— 3.00	— 9.00	0.00
42	—97.33	— 4.00	— 4.00	+ 7.00
43	— 1.33	+ 2.00	0.00	+ 2.00
44	+ 7.66	+ 1.00	— 8.00	— 2.00
45	— 4.66	+10.33	+ 3.00	0.00
46	+ 1.00	— 2.00	— 6.00	+ 3.00
47	—12.00	+ 1.66	+15.00	+10.00
48	—47.33	+ 3.33	—25.00	+ 4.00
49	— 4.66	— 2.33	— 6.00	+ 6.00

The data given in these tables is of more that academic interest, since they demonstrate clearly that the average senior pharmacy student is capable of doing highly precise work when the conditions are such as to require accuracy. With this in mind, it is proposed that all future classes in this laboratory be advised that spot checks of their preparations will be made during the year, and that reasonable accuracy will be expected. It is thought that the first two or three such analyses will help the instructor correct mechanical difficulties responsible for inaccuracies, and this will be done where possible. Closer surviellance of those indicating its need will also be possible, this helping to eliminate personal traits which contribute to inaccuracy. Full cooperation of the students is anticipated, particularly so since it will be announced that any who fail to attain reasonable accuracy in at least half of the analyzed mixtures will not be permitted to pass the course. The ultimate goal of this program is, of course, the engendering in the student of a sense of care and responsibility which, once acquired, will be carried through into his professional practice, making him at all times a safe individual for the compounding of prescriptions.

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Effective Laboratory Teaching in Pharmacy*

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The scope of this paper according to the title assigned has far reaching implications. Laboratory instruction for all pharmacy courses in the four year program could be involved. However, since the paper has been prepared essentially for the pharmacy teachers seminar, it is assumed that the subject matter should be confined to laboratory work associated with those courses ordinarily labeled pharmacy. In this category would be the introductory course in the fundamental principles and processes, inorganic pharmaceutical chemistry, official preparations, and the dispensing courses.

A search of the literature indicated that practically no reports have appeared which deal with studies or opinions concerning effective means for teaching laboratory in pharmacy. Undoubtedly no two pharmacy teachers would ever agree on the scope or method of laboratory procedure for any given course, but some ideas and experiences should be made available in order that a better over-all program of instruction may evolve. "Each teacher works out and executes his own design for education, realizing at all times that his part must fit into the larger institutional plan", according to Dr Pella. The importance of laboratory instruction is too often minimized.[1]

Background Information

Probably the most lucrative source of information on teaching methods comes from the series of papers delivered at the pharmacy teacher's seminar at the University of Wisconsin in the summer of 1949. Christiansen stated the objectives of the seminar to be presentation and clarification for pharmacy teachers the newer facts and concepts concerning subject matter to be included in the area of pharmacy, and to arrange the subject matter in a logical fashion for presentation.[2] Further comment warned that the success of the

*Read before the Section on Pharmacy of the Conferences of Teachers at the 1951 meeting in Buffalo.

seminar would depend upon the extent to which the material presented was utilized and effectively applied. Effective methods of teaching were emphasized in a paper by Pella.[3] The material offered dealt in general with the technics of good teaching which would apply to any field of instruction. Some attention was given to laboratory methods of presentation. It was said that "laboratory is the most costly of all instructional procedures, but properly used it is probably the most effective". Advantages of laboratory are listed as follows:

1. Opportunity to learn by doing. 2. Director contact with material. 3. Learn to follow directions. 4. Properly organized, student records observations and results, summarizes data, and draws conclusions. 5. Learning to handle material and to think independently.

The disadvantages of laboratory instruction are given as:

(1) costly; (2) difficult to schedule under certain conditions; (3) no guarantee student will learn better there than anywhere else; (4) students are unskilled and it is more wasteful of time.

In my opinion the act of learning by doing must start somewhere and these objections are insignificant in view of the responsibilities of colleges to provide such experiences.

Dr. Pella pointed out also, that the demonstration method of teaching when combined with a well-directed discussion is a rather successful teaching technic.[3] Introduction to new dosage forms and to fundamental operations can be done effectively by demonstration at the beginning of a laboratory exercise.

It is further noted that laboratory work is only a part of any total course.[1] Properly used, it will prove a powerful teaching tool. The suggestion is made that as teaching methods advance doubtless more time will be given to laboratory work with less formal recitation and lecture. The laboratory work should be more closely correlated with other classwork. The class work should lead up to and prepare for the work to be done in the laboratory. In effect, Dr Pella expressed the opinion that cook-book methods should not be used and students must be familiar with the objectives of the exercise.[3]

Powers presented the results of a study of changes in types of official drugs during the past several years.[4] Graphs used illustrate

the persistent downward trend in botanicals and the significant increase in the use of organic chemicals. No great changes have taken place in the type of inorganic medicinals and elixirs since 1910. These changes are reflected in both the United States Pharmacopeia and the National Formulary Basic Drugs. In addition, the survey shows the steady decline in the use of tinctures and fluidextracts, with a considerable increase in the use of tablets and ampuls. It should be pointed out that the new admissions to both the official compendiums include new types of drugs, chemicals and pharmaceuticals, for use as entities, or in combinations. In effect, however, the change is progressive, which has resulted in better medication than was ever available to man. Compounding problems of the pharmacist have been considerably decreased as the technics of manipulation have been absorbed by the manufacturer.

Program Integration

It would appear logical that an effective laboratory teaching program in pharmacy would depend upon a coordinated program of instruction based upon wellfounded objectives for each course, and which integrated the work assigned in all laboratories. The basic principle would be the selection of the fundamental principles upon which the preparation of pharmaceuticals depends, and those presented at appropriate places in the curriculum. Unnecessary duplication should be avoided. Other courses may adequately cover certain phases such as specific gravity, heat, etc. In the laboratory portion of all pharmacy courses the products assigned for preparation should be those that have pharmaceutical and therapeutic application. Chemicals that are considered therapeutic necessities or of pharmaceutical usefulness should be assigned to the laboratory course in inorganic pharmacy. When the student reaches the introductory course in dispensing, the fundamental operations are familiar and a knowledge of the ingredients called for on a prescription is a part of a practical background training. Emphasis should be placed on the similarity of official preparations and certain well-established proprietary products.

It has been pointed out that classroom discussion should parallel laboratory work as nearly as possible so that constant reference is being made to any given area of interest, and previous experiences recognized.

Procedure for Assignments

A sufficient amount of practice should be given to each process so that proficiency can be established. For example, in the preparation of suppositories, the student should be allowed to work on several formulations until a familiarity with material and technics is sound. Not that suppositories as such are of unusual importance, but to make them well when called upon is a worthwhile attribute of the pharmacist; at least there will not be the urge to refuse a prescription for suppositories. The same quantity of practice is good for capsules, powders, ointments, and other forms of medication. It would seem that with fewer manual technics to apply, an efficiency could be achieved for those used which would enable the pharmacist to make better use of his formal preparation to serve the allied health professions. One cannot fail to observe that while actually in practice the pharmacist may not be called upon to prepare certain formulations, yet a knowledge of them is of value, if only to satisfy state board examiners. In our laboratory we have not required students to prepare an emulsion by the English method for some years, yet for the first time in many an examination, candidates for registration in Virginia were required to use tears of acacia and make a fixed oil emulsion by the so-called English method.

In carrying out an integrated program of laboratory instruction, it is necessary that the staff of the department of pharmacy arrange for a sequence of assignments which in so far as practical takes the student through various stages, constantly bringing the student in contact with those things with which he or she is familiar. Progress will be based upon learning from previous experiences, and this is the successful teaching method as advocated by Professor Pella.[1]

Laboratory Evaluations

An effective system for grading all laboratory work should be installed. Another paper on this program deals with this subject; however, evaluating preparations made is a vital part of effective teaching methods and is mentioned here. In some instances, a cursory check on the pH may be run for a few student preparations, the class not knowing which ones are to be checked. Litmus paper or the potentiometer may be used, whichever is most suitable in each case. Color, and in some instances taste will be a criteria for

accuracy of preparation. Netz reported on the use of identification tests to better acquaint the student with official preparations.[5] Students were required to identify U.S.P. and N.F. pharmaceutical preparations by the use of color, odor, taste, and appearance. A check should also be made on neatness and correctness of the container and label. Included in the overall picture should be a measure of accuracy on any calculations involved and answers to questions asked in connection with the preparation in question. If some sort of work sheet is used, that too can be a part of the system set up for evaluation of efforts. Unnecessary copying or recording stereotyped answers should be eliminated. The system is not complicated when for each factor to be considered a value is assigned. A point system can be established, and anyone familiar with the method and the preparations would be able to check quickly a set of products prepared by the students during a laboratory session. The method proposed does place laboratory grading on a somewhat quantitative scale and offers to the student an explanation when the question is asked, "What is wrong with this preparation, or how am I doing in laboratory?" Whatever system is used, it can be individualized to serve the purpose. If ten factors about a preparation are to be checked, a perfect score would be ten with one point allowed for each. Ten points for each item would introduce a flexibility, and passing could be arbitrarily established at 70, or some other value. Our attention has been brought to the check method used in the organic chemistry laboratory at the Medical College. Students are appraised of the fact that one of their preparations will be thoroughly analyzed, but which one is not revealed. Several factors such as melting point, weight, and per cent yield, allow for a range in grading. Other products prepared are checked, but not so extensively. A similar procedure could be applied to preparations made in pharmacy laboratories by establishing a quantitative value on factors for the products to be analyzed.

Extra Manipulations

Also useful is the idea of requiring the student to carry out certain extra manipulations on preparations which lend themselves to such tests. The water absorbing properties of the several official ointment bases can be more or less quantitatively determined. A

specified amount of simple ointment, hydrophilic ointments and hydrophilic petroleum can be prepared by the student, who will then add distilled water a small amount at a time until saturation has been reached. The student has a better appreciation of what is meant by a water miscible base.

Certainly at the point where filling capsules is introduced, an opportunity exists to acquaint the student with the relative capacity of various capsules. Capsules can be tared, filled, then again weighed. By difference the powder contained can be recorded. Substances of different densities and capsules of different sizes could be used. The prospective pharmacist has a more practical background when he or she first begins to practice the profession and is not the liability to the employer for the first few months or longer as is generally the case. Perhaps many of these suggestions have been in use, but the literature does not reveal that anyone recorded such procedures. One might postulate that practical experience required for registration would take care of such training as outlined. However, from all accounts, practical experience in a retail pharmacy does not often include supervision in the preparation of various dosage forms.

Sprowls in discussing laboratory teaching of incompatibilities suggested that students be allowed to experiment with certain prescription combinations, then in some instances the findings brought before the class.[6] Incorrect and correct methods for compounding were used and reported to the class for observation and comment. Classroom discussions concerning prescription combinations which adversely effect the therapeutic value or pharmaceutical usefulness is offered as a teaching aid. The actual number of prescription incompatibilities in tdoay's prescriptions is limited, but it is possible to lay stress on those types that do occur. Here is an excellent opportunity to tie in classroom and laboratory teaching.

Whenever possible, an understanding among instructors can be arranged in order that preparations made in one laboratory may be utilized in another. Certain pharmaceutical preparations can in some cases actually be assayed. Goldstein advocates that every assayable preparation compounded by pharmacy students should be tested to determine the precision of work.[7] A good check on at least some preparations is possible while at the same time there is a coordina-

tion of effort which is economical. Preparations made in the galenical laboratory can be used in the dispensing courses.

Coordination of effort will result in increased efficiency and contribute to the effectiveness of learning by doing.

Summary

There appears to be evidence of an increasing appreciation of the value of laboratotry work as a valuable teaching aid. The advantages of laboratory as a teaching method outweigh the disadvantages. Even though the fundamental technics required of the pharmacist are on the decline, there is need for adequate training in those processes essential to good prescription compounding. Effective teaching methods include the proper organization of pharmacy laboratory courses which will emphasize objectives and coordinate the work of all pharmacy courses. Learning by doing is an effective teaching aid, but only when it is planned to produce specific results. Laboratory work should so far as possible be designed to effect progress by learning through previous experience. Demonstration accompanied by class discussion is applicable to laboratory instruction. Extra manipulations may serve to fix more firmly the importance or area of usefulness of certain pharmaceutical preparations. Proper methods for the evaluation of laboratory work is an important factor in getting good results from exercises planned with specific objectives.

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Pharmacognosy and State Board Examinations*

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The writer's opinion is that pharmacognosy is being poorly taught in our colleges of pharmacy, and generally is also being poorly examined as a subject by the pharmacy boards. The end result of this is to decrease popularity of the subject studentwise, and to unfavorably prejudice more than necessary those who must work with it. The salvation of this important phase of pharmaceutical education depends upon the prompt restoration of pharmacognosy to its proper stature in the curriculum, and subsequently to have it taught and examined in a proper and enthusiastic manner. The writer for one cannot appreciate the attitude of those who attack other subjects in the pharmaceutical curriculum presumably for the purpose of seeking aggrandizement of their own. Right now pharmacognosy is the favorite target, but evidence that pharmacy as a subject is next, is clearly visible. It will be a sad day for pharmacy if this proposed dismemberment is allowed to continue.

To a great extent the boards of pharmacy dictate a great deal of what must still be taught in pharmacognosy. To illustrate, the writer does not contend that memorizing a mess of botanical sources is any mark of intelligence, but rather students should know the significance of official sources to the system of science, and to pharmacy and research. However, when we know that the state board examinations will embrace specific botanical origins it leaves us without choice, and we must belabor the students accordingly. To the suggestion that your state board examiners should be approached, the reply, that my own board does cooperate, but what about the examinations in the other forty-seven states. No, the only safe thing to do is teach accordingly and further prejudice the poor student. So you teach B.O.'s and they are asked—everyone's happy. You teach them and they aren't asked. Everyone's mad! You don't teach them and they are asked. Everyone's mad again! What

Read before the Section on Biological Sciences of the Conferences of Teachers at the 1951 meeting at Buffalo.

a dilemma it adds up to, and yet it doesn't appear that it is any worse with pharmacognosy than anything else. It just seems that way.

The writer would like to see the time when there is less emphasis on such memory work and more attention given to the fundamentals of pharmacognosy. It would be appropriate for the examiner to ask about the significance of an official source, and seek the reason why the purpurea species is designated for digitalis powder rather than to merely ask for the botanical source from memory. The writer would wager that most students would fail such a question based upon fundamental systematic botany, but at the same time they have been compelled to memorize meaningless (to them at least) official sources either because the instructor didn't know what else to teach or he was compelled to teach it for fear of state board examinations. The writer is not guessing at this solution, because it is deducted from comments and confessions of teachers of pharmacognosy. You will note the writer did not say pharmacognosy teachers because there is a difference. Teachers of pharmacognosy includes pharmacologists, pharmaceutical chemists, and a varied assortment of other people who can't escape the assignment because there aren't enough pharmacognosy teachers available.

Teachers and examiners alike should spend more attention on constituents of crude drugs, etc., and select the important ones for consideration. The writer shudders in expectation that at this precise moment someone will pop up and make a bad joke about pipsissewa. It's a peculiar situation in that these jesters always select those drugs which the writer must confess he never was belabored with as a student, nor has he belabored students with them as a pharmacognosy teacher. Opium, and Cinchona, and Digitalis, and the likes there of, are never jested about. That is real pharmacognosy, and it includes their sources, commerce, constituents and uses, and even something of their history and romance. Add to drugs like this the new antibiotics, weedacides, insecticides, and the latest developments in improved techniques for handling active constituents and a state board examiner could have an examination to really be proud of.

Now a word on the microscopy side of the ledger. Every official drug is blessed with a complete monograph, which all together

adds up to a considerable portion of the U.S.P. and N.F. These monographs contain detailed drug descriptions together with various methods aimed at the control of quality and identity of each product. To the writer's memory never has a state board examiner asked a good constructive question concerning the interpretation of these microscopic features. It isn't out of reason to expect a student to be able to use the microscope, nor to reproduce on examination typical plant tissue structures which could be mentioned as excerpts taken directly from the official descriptions. A typical question could be like this. "The following tissue structures are mentioned for Digitalis and Cinchona in the official monographs. Illustrate with labeled drawings what the tissue structures are and comment on their function in the plant." It doesn't seem that a question of that sort is out of line on a state board examination, and certainly if we lay claim to being a professional group our claim is based on the assumption that we must know more about all phases of our education and training than any other group. This paper was prepared in the interest of having pharmacognosy better taught in our schools, and better examined by our state boards, and thus help us to qualify more fully as professional people.

Pharmacognosy Laboratory Work. Some of Its Important Aspects.

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In undertaking to present some thoughts on laboratory work in pharmacognosy, I decided that offering some general concepts around which each teacher might fashion his own laboratory exercises would be most profitable to the group. Much, indeed most of what I have to say this morning is applicable to laboratory courses in sciences

other than pharmacognosy but that does not make it any less pertinent.

Everyone, I think, will accept the proposition that the laboratory work should be integrated as closely as possible with the didactic work. Therefore the general objectives of the pharmacognosy course as a whole will be shared by both phases and the laboratory phase will have additional supplementary objectives. The general objectives proposed by the Pharmacognosy Committee of The Pharmaceutical Survey are familiar to teachers in this field. A recasting of course objectives for the sake of emphasis has produced the following six general objectives:

1. **To acquire a knowledge of the basic principles of pharmacognosy.**
2. **To develop some skill in the use of technics essential to the study of drugs.**
3. **To acquire a knowledge of sources of information relating to drugs and an ability to intelligently read and interpret literature relating to the study of drugs.**
4. **To develop ability to apply a fund of information to the identification and evaluation of drugs.**
5. **To develop ability to correlate the properties and characteristics of drug materials with their final disposition and use as pharmaceuticals, medicaments or economic products.**
6. **To develop accuracy of observation and ability to apply principles to new situations.**

The even numbered objectives of this list have particular significance for the laboratory course.

There is perhaps no need to dwell on the topic of course objectives. Each teacher will modify and elaborate on any given list according to his individual orientation and his local situation. However, the desirability of having clear and definite objectives for the course, of setting them up as guideposts for the students at the beginning of the course, and of periodically checking progress toward the goals is worth emphasizing.

Another topic I believe worthy of emphasis is the basic importance of scientific method. The fundamental matrix of the pharmacognosy course should be an awareness of what Conant has called the "tactics and strategy of Science". In the laboratory course there is an unique opportunity to develop habits of careful observation and critical comparison and to apply experimental procedures to the solution of problems.

The mental *modus operandi* commonly called scientific method should become part and parcel of the student's habit of thinking as early as possible. Whatever he has achieved in this direction before he comes to the study of pharmacognosy makes the task of the teacher that much lighter. However, his further development in the scientific habit of thought can be and should be augmented by his work in pharmacognosy.

The mental habit which can be epitomized by *Observe, Think, Experiment,* is at the core of all science. Although specific procedures necessarily vary according to the nature of particular problems, observation, comparison, generalization, verification and experimentation are essential components of scientific method.

1. **Observation:** Accurate observation and measurement is a fundamental requirement of science. Data may be accumulated from direct observation or from interpreting trustworthy reports. We may even be able to represent the qualities of objects by numbers, which is measurement.

The facts that are garnered from careful observation and experiment must be recorded in definite and precise terms after they have been critically examined as to their truth.

Manipulation or imposing a set of conditions of our own making, "experiments for discovery", enables additional data to be gathered.

2. **Comparison:** Comparison, i.e., classification and correlation of the data derived from observations and experiments is a second step on the pathway of scientific method. It is by critical comparison that the relevance of previously unrelated facts may be perceived.

By classifying the factual data according to similarities and differences, i.e., on the basis of common attributes, general relationships are revealed. And by correlating the frequency with which the classified data are associated with other classes of data further general relationships may be discovered.

Careful classification and correlation precede the formulation of a generalization just as proper placement and alinement of the building stones precede the erection of the edifice.

3. **Generalization:** The organization of facts into a precise statement which accurately records the characteristics of members of

a particular class is a generalization. Descriptive science goes this far. It states how nature works but not why.

The explanatory expansion of science is by deduction and induction. To infer from the evidence, i.e., to deduce a further extension which is implied by the generalization is not common and usually is of slight importance. But inductive "hunches" or "intuition" which leads the imaginative mind to devise hypotheses from generalizations is a very significant process for expanding science. When hypotheses are preceded by intimate familiarity with the facts they are most likely to be significant. Inspired, factually-founded guesses are useful starting points for further investigations because the implications of an hypothesis enable additional facts to be predicted.

This brings us to another step on the pathway of scientific method.

4. **Verification:** A generalized statement or an hypothesis must be verified by repeated testing and retesting. The deductive inference that *if* the statement or hypothesis is correct *then* certain anticipated observations would have to be true, of course, precedes the actual checking of the facts by experiments. Experiments must be planned to check on the implications and to verify the facts predicted by the hypothesis thus improving its accuracy and usefulness.

If an hypothesis time and again stands the test of newly discovered facts it is called a theory. But hypothesis and theories are abandoned when they no longer provide adequate bases for accumulating new facts. The general truths or natural laws which are a goal of scientific endeavor are derived only from verified facts which have been accumulated through endless observations, comparisons and experiments.

This summary characterization of the methodological "heart" of the course in pharmacognosy (or pharmacology, or physiology) will, I hope, suggest a reexamination of laboratory work with a view to accenting such fundamentals. In addition to developing an awareness of the scientific method the course work should also provide training in its use for attacking problems.

Pharmacognosy Laboratory Work: Some of Its Most Important Aspects*

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Five or more years after graduation, what the average student best remembers of his Pharmacognosy course is the work he did in the laboratory. If we accept this premise, then the laboratory work in pharmacognosy should receive the emphasis to which it is entitled through a carefully planned schedule of laboratory exercises in which the student carries out most of the work under the supervision of a capable instructor.

The schedule of exercise should be systematic and properly proportioned so as to include adequate training in the most important phases of pharmacognosy which deal with the identification of plant and animal drugs, medicinal and poisonous plants, and tests for the purity and quality of vegetable and animal drugs, and important active constituents.

One of the most important objectives to be sought in the laboratory work is that of training the undergraduate to observe correctly and exhibit his capacity to do so by making carefully labeled drawings and diagrams of materials given him for microscopical examination. These and reports on tests for the identification, purity and quality of the drugs studied should be called in preferably before the close of each laboratory period, later graded and returned to the student.

The important phases of laboratory work should include the following:

1. **The macroscopical examination of entire crude drugs and their products. In this connection the official drugs and others in common demand should be compared by the student with descriptions in the text book or reference work.**

2. **Training in the standardization of the ocular micrometer and the application of it to the measurement of starch grains, pollen grains, cell walls, crystals and other histological elements.**

3. **Training in making transverse, radial longitudinal, tangential longitudinal and surface sections of drugs, staining, and the preparation**

Read before the Section on Biological Sciences of the Conferences of Teachers at the 1951 meeting at Buffalo.

of temporary mounts and permanent mounts in Glycerin jelly and in Canada balsom.

4. The microscopical examination of sections of the more important drugs and types of drugs even though the latter may be unofficial. It is important in this connecton that the student receive types showing both normal and abnormal structures.

5. The microscopical examination of powdered drugs and adulterants.

6. Examination of pollen grains of a limited number of hay fever plants.

7. Microsublimation of a limited number of drugs, such as Rhubarb Sumatra and Siam Benzoin and Cantharides.

8. Micro-chemical tests for cell walls and non-protoplasmic cell contents, using drugs as materials.

9. A limited number of chemical tests for the determination of the identity, purity and quality of commonly used official drugs.

10. Examination of specimens of outstanding medicinal, aromatic, poisonous and allergenic plants.

11. Examination of cultures of *Penicillium notatum*, *Streptomyces griseus* and other antibiotic yielding organisms. Examination of important antibiotic products in original packages.

12. Examination of preserved endocrine glands of domestic animals and endocrine products.

13. Microscopical examination of teased out animal tissues to acquaint students with appearance of connective, muscle, epithelial and nerve tissues.

14. Microscopical examination of temporary mounts of powdered, desiccated thyroid separately in Mallory's stain, and in Mallory's stain and 1% phosphotungstic acid, and of a suspension of powdered thyroid, previously stained with a mixture of equal parts of Delafield's hematoxylin and eosin solution in xylol, to identify the diagnostic elements, namely colloid, follicular epithelium and connective tissue elements. If time permits, powdered desiccated corpus luteum and suprarenal can be added and comparisons made with descriptions in the text or manual.

In the laboratory work of pharmacognosy at the Massachusetts College of Pharmacy, we follow chiefly the taxonomic and morphological methods of classification. We illustrate the exercises with charts, blackboard sketches, herbarium sheets, and frequently fresh medicinal, aromatic and poisonous plants brought in from the College garden or field. Each student is provided with a representative specimen of most of the drugs in the manual and about 60 powdered drugs and adulterants, a simple and compound microscope, reagents, slides, cover glasses, forceps, elder pith, syracuse watch glasses, rezor blades and other necessary accessories. He also receives a set of

"The form of these programs would depend upon the ingenuity of the planners and upon the resources available. It may be that each graduate department would prefer to plan this activity independently. slides of stained permanent mounts of sections of drugs and adulterants for laboratory study.

At intervals during the course, we give our students drills in the determination of numbered samples of whole and powdered drugs, some of which contain adulterants which they had previously studied.

A Teacher-Training Program in Pharmacy Administration*

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We would like to begin this paper by reading two quotations from the Report of the President's Commission on Higher Education.[1] The first of these quotations is from the first part of the report entitled "Establishing the Goals", and reads as follows:

"Preparing College Teachers. It is in the preparation of College teachers that the graduate-school program is seriously inadequate. Its single-minded emphasis on the research tradition and its purpose of forcing all its students into the mold of a narrow specialism do not produce college teachers of the kind we urgently need.

"The more alert and thinking among college administrators have for years been asking, usually in vain, for teachers with different training and different skills. They want teachers with less-narrow interests and more intellectual curiosity and aliveness; teachers with more stimulating personalities and more experience of the world off the campus; teachers with more ability to synthesize and interpret facts; teachers with more ability to communicate ideas and attitudes.

"Without such teachers general education and liberal education of broadened scope are impossible. Without such teachers we shall not achieve the objectives and the programs recommended in this report. The graduate schools must provide the sort of educational experience that will produce such teachers. The present requirements for the doctor's degree will not do so.

*Read before the Section on Pharmacy Administration of the Conference of Teachers at the 1951 meeting in Buffalo. Messrs Hook and McEvilla are Fellows in Pharmacy Administration, University of Pittsburgh.

"Perhaps the place to begin the process of reform is with the graduate faculties themselves. In few cases can the same man function satisfactorily on the level of intense specialization and preoccupation with research and also on the level of broad synthesis and general education. Not many men can serve two such different masters. A special effort should be made, therefore, to add to graduate teaching staffs men of broad knowledge, men of imagination and understanding, and wisdom. They can then educate others, who will educate others and others, on through the whole educational system."[2]

The second quotation is from part four of the report, entitled "Staffing Higher Education" and follows the heading "Internship Program":

"The great majority of graduate students preparing for academic careers in the colleges go directly into teaching. Smaller numbers begin their careers as researchers, counselors, or special service personnel. A few, usually the more mature individuals, go directly into administrative positions.

"This Commission recommends that the graduate schools take advantage of the opportunity and the obligation to make a distinguished contribution through providing internship training for those who plan to enter these different fields. The proposal represents a departure from current practice, but one not too difficult to achieve. Most of the elements necessary for successful internship programs are already available on the campus.

"For the Prospective College Teacher. The medical and engineering professions have demonstrated the value of internship as preparation for successful performance. College teaching can derive equally substantial benefits.

"A careful arranged period of supervised internship should become the very keystone of an effective preparatory program for college teachers.

"What is contemplated here is something far more comprehensive and more expertly aimed at developing teaching competence than the typical graduate assistantships, although based upon the same principle. In most cases, these assistants receive little or no supervision in their teaching. The intern would not be one who performs only the simple and repetitive tasks connected with teaching, nor would he do one segment of the teaching job without helping to plan the whole. Internship would be on-the-job training in the finest sense of the term.

"This Commission recommends that each graduate school engaged in the preparation of individuals for careers in higher education take steps immediately to expand the supervision of their instructional and research fellowships into a program of real internship.

On the other hand, individual departments may wish to call upon the graduate school or department of education for assistance. It is possible that adequate opportunities for directed classroom experience could be found on the campus of the institution operating the program. It may be necessary or desirable to establish working relationships with nearby junior colleges or 4-year institutions.

"Internship might well contemplate some full-time employment in fields other than teaching. The college teacher needs a rich background of experience in other than academic pursuits. For example, the teacher of economics or business administration could present his theories with much greater vigor after a period of service in business or industry. Teachers of foreign language or international relations could profit enormously from a period of travel abroad, an opportunity now available to many through the Fullbright plan. The political scientist who has worked within government at the local, State, or Federal level is professionally enriched by this experience. The possibilities for such arrangements are limited only by the energy and resourcefulness of those who operate the internship activities.

"The core of the internship, however, will remain centered about improving the prospective teacher's performance in the classroom. It will be necessary to greatly extend research into the processing of learning and teaching and of improving evaluation procedures. The inauguration of the internship program should not await the establishment or expansion of these research projects in teaching techniques. They are simply the means of providing for its constant betterment."[3]

It was with the thought of these two quotations in mind that two Teaching Fellowships in Pharmacy Administration were established at the University of Pittsburgh. In general, the Fellow teaches undergraduate courses in pharmacy administration under careful supervision to the extent of 6 credit hours—a half-time program. Simultaneously, he pursues the graduate program in Pharmacy Administration leading to the Master's degree on a half time basis. In this way it requires two academic years to obtain the Master's degree.

It is felt that the Teaching Fellowships meet the situation described in the two quotations above. A Teaching Fellow, upon the completion of his course will be a registered pharmacist, he will have had practical drug store experience, usually at the management level, he will have a background of business administration and pharmacy administration at the graduate level, and he will have had two years of half-time controlled and supervised teaching experience.

The graduate program leading to the Masters' Degree has the following requirements for admission:

(1) A Bachelor's degree from an accredited school or college of Pharmacy with an overall minimum quality-point average of 1.5.

(2) Eighteen (18) undergraduate credits in pharmacy administration, economics, or related business subjects with a 1.5 minimum quality-point average.

(3) Six (6) credits in principles of economics.

(4) Acceptance by the department after a personal interview.

The requirements for graduation are based upon a minimum of thirty (30) credits with at least a 2.0 quality-point average. The total of thirty (30) credits must include twelve (12) credits of graduate courses in Pharmacy Administration; six (6) thesis credits; and twelve (12) credits of graduate courses elected with the approval of the major advisor and the Dean of the Graduate School. These courses may be selected from offerings of the School of Pharmacy, the School of Business Administration or the School of Education. In some cases certain courses given in the Research Bureau for Retail Training may be elected. A wide selection of electitves is permitted. Teacher-training in Pharmacy Administration is emphasized at the present time, however, a shift in emphasis to executive personnel training is contemplated as the need for teachers in pharmacy administration approaches normal.

The twelve (12) credits in pharmacy administration now offered are as follows:

201 Principles of Retailing.....3 cr.
202 Marketing of Drug Products.....3 cr.
203 Management: Store Operation.....3 cr.
204 Management: Merchandising and Control.....3 cr.

These courses are repeated during the regular six-week summer session in alternate years, two courses being offered each summer. This makes it possible for a teacher who cannot get away during the regular two semesters, to earn the Master's degree over several summers.

A proposal to extend courses in Pharmacy Administration to the Doctorate level is now under consideration.

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1. *Higher Education for Democracy*, Washington, D.C., 1947
2. Ibid, Volume I, Establishing the Goals, p. 89
3. Ibid, Vol. IV, Staffing Higher Education, pp. 20, 21

Benefits Attainable from the Quantitative Evaluation of Student Preparations*

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Every teacher charged with the duty of grading student preparations soon realizes that the grades are grossly superficial if based only on those qualities easily discernable, such as appearance, odor, choice of suitable container, size of container, type and size of stopper, and labeling. While all of these qualities are worthy of consideration in judging the final perfection of the product, there is an omission of the most important of all factors, the accuracy with which the product was prepared.

It is well known that assay procedures are time consuming. It is not proposed here that all preparations must be assayed accurately. Rather, by the discussion of specific examples, it will be shown that assays can be modified toward their simplification and applied to some student preparations with excellent effect toward increasing both the quality of student work and the accuracy of grading.

It was found, for example, that the volume of liquid preparations varied considerably from the correct volume. This inaccuracy was caused by carelessness in reading graduates, incomplete draining of graduates, and reliance on bottle graduations. It was not unduly wasteful of time to check the volume of a few successive preparations. The following schedule of penalties was applied to the perfect grade of 10. (It is preferable to grade on the basis of ten units or twenty half units because numbers are so much easier to average than letters or symbols).

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*Presented before the Section on Pharmacy of the Conferences of Teachers at the 1951 meeting in Buffalo.

Sample Schedule of Penalties for Incorrect Volumes

Correct Volume, 120 cc.

Error		Penalty
plus or minus	3 cc.	none
plus or minus	4-5 cc.	—1
plus or minus	6-7 cc.	—2
plus or minus	8-9 cc.	—3
plus or minus	10-12 cc.	—4
plus or minus	13-16 cc.	—5
plus or minus	17-20 cc.	—6
plus or minus	21-24 cc.	—7
plus or minus	25 cc. or more	—8

The improvement of accuracy was so prompt and so complete that this type of quantitative check became necessary only for those samples which were obviously incorrect and for an occasional check on the whole class.

The specific gravity of a preparation indicates the accuracy of its content. Specific gravity can be measured with compatible accuracy and speed by using the Westphal balance. This instrument is particularly convenient because the plummet can be dipped into the container of each preparation, thus eliminating a waste of time for pouring. Specific gravity gives a significant indication of quality for syrups, solutions, and alcohol dilutions. The following schedule gives an example of grading the quality of Syrup, U.S.P., sp. gr. 1.313. In this table each "x" represents a student's preparation.

Sample Schedule for Grading Syrup, U.S.P.

Amount, 120 cc. Hot Process

Sp. Gr.	No. of Students (19)	Penalty
1.330	X X	—3
1.325	X X X	—1
1.320	X X X	none
1.315	X X X X	none
1.310	X X X	none
1.305		none
1.300	X	—1
1.295	X	—2
1.290	X	—3
1.285	X	—4

Many volumetric assays are available for use in this type of grading. Direct titrations with volumetric solutions of hydrochloric

acid, of sodium hydroxide, of sodium thiosulfate, and of iodine have obvious applications. It sometimes occurs that assays formerly official are more convenient for this work than more modern methods. For example, it may be more convenient to use sodium thiosulfate V.S. than potassium arsenite V.S. for titrating the iodine in Lugol's Solution.

There are certain short-cuts which may be adopted for greater speed in this work since absolute accuracy is not necessary. The pipettes and titration flasks need only be drained, not even rinsed. Indicators can be diluted so that one squirt from a medicine dropper gives the correct amount. The strength of the volumetric solution can be adjusted to give a convenient relationship of the volume to the final answer. To illustrate this point, it requires only a simple calculation to show that the correct amount of iodine in a 10 cc. sample of Strong Iodine Solution will react with exactly 10 cc. of sodium thiosulfate solution if the latter has a strength of 0.394 *N*. With this volumetric solution the volume required for the end-point multiplied by ten gives the percentage of the correct amount in the sample. Thus 100% is perfect; while 105% shows 5% too much iodine.

It is always well to check the assay method against a known sample prepared by the grader using the same ingredients and quality of equipment used by the students.

It is also possible to improvise assay methods when needed. To assay 1-1000 mercury bichloride solution an adaptation of the Mohr method was used. A 50 cc. sample was delivered into an Erlenmeyer flask, 1 cc. of 5% potassium chromate solution was added as the indicator, and the titration was completed using a silver nitrate solution containing 6.257 Gm. to the liter. The end point consists of a change in color to salmon pink. Although the volumetric solution was calculated to require a volume of 10 cc. for the perfect preparation it was found that 0.7 cc. had to be subtracted to correct for the end-point.

In one of the beginning classes the students were assigned the preparation of 60 cc. of 1-1,000 mercury bichloride solution. The fact that 60 mg. is not easy to weigh accurately and to use without loss is indicated by the results of the assay, but the fact that it can be done is proved in the "repetition" column which gives the results

of the students who received such low grades that they asked for permission to repeat the preparation.

Sample Schedule for Grading Mercury Bichloride Solution

Strength, 1-1,000 **Amount, 60 cc.**

Percentage of the Correct Amount	Number of Students (20)	Penalty	Repetition
6-15	X	—8	
16-25		—7	
26-35		—6	
36-45		—5	
46-55		—4	
56-65		—3	X
66-75		—2	
76-85		—1	
86-95	X	none	X X X
96-105	X	none	X X X X
106-115	X X	none	X X X X
116-125	X X	—1	
126-135	X	—2	
136-145	X X X	—3	
146-155	X X	—4	
156-165		—5	
166-175	X X X	—6	
176-185	X X	—7	
186-195		—8	
196-205		—8	
206-215	X X	—8	

The preparation of aromatic waters requires the careful application of good technique. To evaluate the degree of saturation an assay was devised on principle that a saturated sodium chloride solution will produce cloudiness when added to an aromatic water by salting out a part of the volatile substance. Camphor Water is used here as an example. A saturated solution of camphor was prepared and this solution was accurately diluted to produce different degrees of saturation. The titration of 10cc. samples with saturated salt solution gave the following results: 100% saturated, 0.8 cc.; 95%, 1.2 cc.; 90%, 1.9 cc.; 85%, 2.5 cc.; 80%, 3.3 cc.; and 75%, 4.2 cc. This data was then used to grade samples of the aromatic water prepared by students.

Sample Schedule for Grading Camphor Water, U.S.P.

Amount, 180 cc. Method, talc.

Volume of Saturated Salt Solution	Saturation Percentage	Number of Students (31)	Penalty
less than 1.2 cc.	100%	X X X X	none
1.3-1.9 cc.	95%	X	—1
2.0-2.5 cc.	90%	X X X	—2
2.6-3.3 cc.	85%	X X	—3
3.4-4.2 cc.	80%	X X X	—4
4.3-5.5 cc.	75%	X X X X	—5
5.6 cc. or more	less than 75%	X X X X X X X X X X X X X X X	—6

The value of his type of grading is obvious when it is realized that the good samples of Camphor Water could not be distinguished from the weak samples on the basis of odor.

It is not expected that this discussion represents a new basic idea; rather it is hoped that these few details will serve as an encouragement for the better quantitative grading of preparations.

The benefits from the additional work for this type of grading are well worth the effort. The student's accuracy is improved. He will learn that it is necessary to follow directions with attention to detail. His grade will be a more accurate rating of his ability. Finally, his respect of the teacher will be increased because the intrinsic quality of his work is being tested.

New in the Family

Linda Kay Christian.—Born May 7, 1952, daughter of Dr. and Mrs. John E. Christian, Purdue University.

Susan Elaine Holck.—Born April 29, 1952, daughter of Mr. and Mrs. Manfred Holck, Jr., third grandchild of Dr. and Mrs. C. C. Albers, University of Texas.

An Opportunity for Learning in the Undergraduate Chemistry Laboratory Course

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Massachusetts College of Pharmacy

A science, such as chemistry, attempts to describe experimental facts as simply, exactly and completely as possible so that anyone following the conditions of the situation may duplicate the facts again and again if required.

Many opportunities to gain such an understanding of nature present themselves to most observant and eager students of science. Too often these opportunities draw little attention and pass away quickly, without a trace.

During the course of laboratory work at the Massachusetts College of Pharmacy of the past year such an opportunity came to the author's attention, mainly because of the questions aroused in the minds of the students at the time. It so happened that a number of them observed one series of results and others a different one. In other words, the results were not duplicates of each other.

Aroused curiosity prompted further study of this situation which raised the old familiar question, "How come?" Apparently the chemistry involved in the reaction between strong sulfuric acid and metallic copper is not as simple and straightforward as we believe and write it in equation form.

Some textbook authors state the reaction in one way and others in a different way, or dismiss the subject with a general reaction statement.[1] Let us examine this situation and try to maintain the students' viewpoint.

The Given Laboratory Directions

"Add about 2 cc. of sulfuric acid to 10 milligrams (0.010 Gm.) of copper contained in a test tube and heat *gently*. Note the odor of any gas produced. Cool and note the color of the contents. Pour the contents into 10 cc. of water in a beaker and note any change in color." These questions then follow: "a) Why heat gently? b)

*Read before the Section on Chemistry of the Conferences of Teachers at the 1951 meeting at Buffalo.

What is the black precipitate? c) Why dilute with water? d) Balance the equations. e) Write one balanced equation for the reaction."

This series of directions and questions appears to adequately cover the reaction and results, yet all students were unable to duplicate the experimental facts. In addition the reaction is discussed at some length at a pre-laboratory instruction period. At this time the reaction is represented to the students by the over-all-equation: $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$ with the comment that this does not represent the true course of the chemistry since the surface of the copper blackens and insoluble dark colored products appear. Then the step equations are presented:[2]

$5\,Cu + 4\,H_2SO_4 \rightarrow Cu_2S + 3\,CuSO_4 + 4\,H_2O$

$Cu_2S + 2\,H_2SO_4 \rightarrow CuS + CuSO_4 + SO_2 + 2\,H_2O$

$CuS + 2\,H_2SO_4 \rightarrow CuSo_4 + SO_2 + S + 2\,H_2O$

$S + 2\,H_2SO_4 \rightarrow 3\,SO_2 + 2\,H_2O$

$5\,Cu + 10\,H_2SO_4 \rightarrow 5\,CuSO_4 + 5\,SO_2 + 10\,H_2O$

The above equations add up to and simplify the equation:

$Cu + 2\,H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2\,H_2O$

Inspection of this last equation and some knowledge of the materials and products would indicate and predict that the red copper metal would disappear and the blue color of the more or less hydrated cupric ion remain in the reaction mixture in the tube.

Some Observations on the Course of the Reaction

A majority of the students in the class of about 150 pupils obtained a nearly colorless reaction mixture when hot and a white to gray white precipitate on cooling to room temperature. When poured into 10 cc. of water in a beaker a more or less blue colored solution resulted.

The others obtained a brownish black mixture and precipitate, the amount of which increased with prolonged heating. When poured into 10 cc. of water in a beaker a blue solution resulted out of which separated a black and a brownish red precipitate.

These two different results by the two groups of the same laboratory class prompted this paper.

That the reaction proceeds in a different way than indicated by any of the equations is shown by the appearance of finely divided elemental copper on dilution in water, as pointed out above.[3]

Some Students' Thoughts on the Direction of the Reaction

Students can interpret the results as indicating that the group obtaining the expected results caused the reaction to proceed rapidly in the order of the over-all-equation, as given, without appreciable amounts of intermediate products accumulating within short time periods. The gas produced could be tested for by its specific properties as studied previously and the salt formed could be purified by recrystallization and the ions present tested for by reactions familiar to the student.

The other strange results mentioned are not easily interpreted by the student, because of limited experimental knowledge at this point of the course. From the students knowledge of sulfides and oxides the black colored products would suggest some oxidation product of the copper metal united with a reduction product of the sulfuric acid. On the basis of the given equations the student can definitely interpret the product possibilities, yet this formation of what the student correctly identifies as free copper cannot be explained as yet. However, the student may admit that oxidation and reduction has occurred.

Again, we must admit that this reaction is not as straight forward as some indicate nor as easy to control as they would have us believe.[4]

Some Calculations Leading to More Knowledge

Study of the quantitative aspects of a reaction can lead the student to much interesting information.

Sulfuric acid molecular weight 98± contains about 96% ± of pure hydrogen sulfate (H_2SO_4) and has a specific gravity of 1.84±, therefore 1 (ml) or cc. weighing 1.84 Gm. will contain: $1.84 \times .96 = 1.75\pm$ Gm. pure H_2SO_4.

Therefore 2 (ml) or cc. of sulfuric acid will supply 3.5± grams of pure hydrogen sulfate (H_2SO_4) for reaction with 10 milligrams of copper.

$$\begin{array}{lll} Cu & + 2\,H_2SO_4 \Rightarrow & CUSO_4 + SO_2 + 2\,H_2O \\ 63.57 & 2\,(98.076) & \\ 0.010\ Gm & ?\ Gm. & \end{array}$$

Therefore 10 milligrams (0.010 Gm) of copper will require

$$\frac{63.57}{2(98.076} = \frac{0.010 \text{ Gm.}}{X \text{ Gm.}}$$ X = 0.03085 Gm. of pure hydrogen sulfate, (H_2SO_4).

This amount is about 1/50 (ml) or cc. but the directions for the reaction call for 2 (ml) or cc. to react with 10 milligrams of copper so it is seen that a large excess of the acid is present. It is reasonable that to expect the reaction to follow the over-all equation type.

$$5\ Cu + 4\ H_2SO_4 \Rightarrow Cu_2S + 3\ CuSO_4 + 4\ H_2O$$

This equation, the first of the step equations, indicates that 10 milligrams of copper would require:

$$\frac{5(63.57)}{4(98.076} = \frac{0.010 \text{ Gm.}}{X \text{ Gm.}}$$ X = .01237 Gm. of pure hydrogen sulfate (H_2SO_2)

To carry the reaction through the second step requires:

$$5\ Cu + 6\ H_2SO_4 \Rightarrow CuS + CuSO_4 + SO_2 + 6\ H_2O$$

$$\frac{5(63.57)}{6(98.076)} = \frac{0.010 \text{ Gm.}}{X \text{ Gm.}}$$ X = 0.01851 Gm. of pure hydrogent sulfate (H_2SO_4)

of pure hydrogen sulfate (H_2SO_4)

To carry out the half-step oxidation by the equation:

$2\ Cu + 2\ H_2SO_4 \Rightarrow Cu_2SO_4 + SO_2 + 2\ H_2O$ requires:

$$\frac{2\ (63.57)}{2(98.076)} = \frac{0.010 \text{ Gm.}}{X \text{ Gm.}}$$ X = 0.01542 Gm. of pure hydrogen sulfate (H_2SO_4)

It is thus seen that various proportions of metal and sulfuric acid are required to complete the step reactions. The spread is from 1 of metal to 2 of acid to 1 metal and 1 acid. The ratio of the reactants to one another apparently does govern the course of the reaction. Hence the difference in the reaction results may be explained by differences in the proportions of the reactants. To test this idea, 2 ml. or cc. portions of acid were reacted with varying amounts of copper. By calculation 1 gram of copper should require 3.08± grams of pure hydrogen sulfate (H_2SO_4) for the over-all-type reaction. Experimentally however, it was found that more than about ¼ gram of copper would result in sulfide or other product formation which would not yield a clear solution in water.

Some Conclusions and Summary

1. The experimental results from the chemical reaction between copper chips and/or turnings and sulfuric acid, concentrated, employed for the preparation of small amounts of sulfur dioxide gas caused some observant student members of a laboratory class to examine the reaction more closely and critically.

2. Two different experimental results obtained by two random groups in the class suggested that some variation in the course of the reaction had taken place and an explanation was called for.

3. The information given about the reaction on the laboratory directions and questions, together with the usual discussion disclosed some clues as to the possible course of the chemical changes.

4. Careful observation of the reactants and the products obtained furnished additional information.

5. A few simple calculations and the derivation of reactant ratios from the equations added more information and suggested that the proportions of the reactants exerted some control over the course of the reaction.

6. It can be concluded that one group had used the proportions called for in the over-all-reaction, whereas the others had used more of the copper thus upsetting the ratio of one of copper to two of sulfuric acid required. Therefore some one or more of the other step reactions proceeded to near completion.

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The Use of Photostatic Positive Prescriptions in Teaching Senior Dispensing Pharmacy

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In the fall of 1949, a number of prescriptions were procured from a summer resort pharmacy in Rockaway, Queens. These prescriptions were representative examples of prescription writing from various physicians in various localities in Greater New York. The Brooklyn College of Pharmacy also possessed a number of current files, and older books filled with prescriptions. These latter prescriptions, filed in huge books, represented the older filing system of the older prescriptions, written by the older, perhaps deceased, physicians.

The prescriptions were scanned, and a series of practical ones were chosen. These were unusual in the sense that each exhibited a single or a number of teaching points.

These, chosen as exemplary prescriptions, can by no means take the place of the multitude which one compounds and/or dispenses in the average pharmacy. However, these stress the importance of experience, the individuality of each prescription, and certain teaching principles.

After several months, approximately forty photostatic positive copies of each prescription were prepared. This was completed during the early part of 1950.

Our course, at that time, consisted in preparing three prescriptions per laboratory period which appeared on a mimeographed sheet. These mimeographed sheets were distributed at the beginning of each two hour laboratory session, and the students were briefed by the instructor in charge.

Not infrequently, after February 1950, we distributed the individual photostatic positive copies, for discussion, as a "trial balloon". The students welcomed this additional assignment. Each viewed the photostatic positive prescription in a different light; each found a different flaw; each encountered a different difficulty. The preliminary trials were quite successful

During April, May, and June 1950, a new program of prescriptions was planned for the school year 1950-51. This new program omitted many of the prescriptions heretofore used, chose new ones, and instituted the photostatic positive prescription.

Our new program consisted in the students preparing two prescriptions which appeared on a mimeographed sheet, and a photostatic positive prescription. These were distributed at the beginning of each two-hour laboratory session.

This new program had the objective of giving the student a background of experience as closely as possible to the conditions prevailing in a modern pharmacy prescription department.

We predicted certain difficulties. We had sets of chemicals and galenicals for the old program. New sets had to be prepared; new medicinals had to be ordered from the sources of supply.

During the senior year, it was our belief, that the student be allowed to tackle the two prescriptions on the mimeographed sheets with a minimum of briefing by the instructor. The third photostatic positive prescription, however, was to be discussed fully.

A lively discussion always preceded the preparation of the photostatic positive prescription. The discussion related to the legibility of certain written material on the prescription, the omission of certain data by the physician, certain incompatibilities or peculiarities, and the method of preparation. The method of preparation usually provoked the most comment. Numerous students proposed one suspending agent in certain mixtures; another decided upon some other. One student wanted a certain order of mixing; another decided upon a different order of mixing. One student wanted additional absorbent powder in a particular capsular preparation; another thought enough powder diluent was already present to offset the need of an absorbent powder. Needless to say, many of these problems or proposals could only be settled by the actual compounding of said prescription in the manners proposed, and comparing the ensuing results. The students were, in general, given complete freedom in their manner of preparation, provided they recorded their particular procedure on a paper, and attached said paper to the prescription container. The attached paper was for unorthodox or ingenious compounding so that the instructional staff could evaluate

the merit of certain unusual procedures, and recommend the procedure of greater merit. Needless to say, the student is always required to indicate unusual procedures and/or the quantity of additional agents in his notebook, which represents his prescription file.

Throughout this new program the student has been encouraged to rely on his own initiative. He has shown a greater interest in the course since the advent of the photostatic positive prescription. The photostatic positive prescription psychologically represents the "real thing". The student looks forward, at times, to his proposed procedure receiving the recommended merit. That pleasure imbues him with greater confidence than any grade.

The instructional staff, too, has profited. Many textbook ideas and theories relating to practical pharmacy have been overthrown by some of the so-called weird, yet proven to be better, student procedures.

Today, 1951-52, we have a smooth running, interesting, enjoyable, profitable, and practical senior dispensing laboratory session at the Brooklyn College of Pharmacy.

The Remington Medal and the J. Leon Lascoff Awards.—Announcement of these awards have been made for 1952. The Remington Medal goes to Patrick H. Costello in recognition of his long and distinguished service to pharmacy, especially as secretary of the National Association of Boards of Pharmacy and secretary of the American Council on Pharmaceutical Education. According to custom the medal presentation wi'l occur at the late fall dinner meeting of the New York Branch of the American Pharmaceutical Association in New York City.

The Lascoff Award, made available by the American College of Apothecaries will be presented at the August meeting of the Association in Philadelphia to Dr. Robert P. Fischelis, secretary and general manager of the American Pharmaceutical Association in recognition of his distinguished leadership in retail, hospital, and manufacturing pharmacy and in fact in practically every field of pharmaceutical endeavor. The awarding of these awards to these recipients will meet with the universal approval of educators, the profession and industry.

The Editor's Page

In the days when we are coping with the problem of curriculum building in an effort to better prepare the prospective pharmacy student for professional study and practice, it is well that we should consider the viewpoint of the intelligent layman concerning the preparation of the student for the professions. Speaking of the responsibilities of university authorities toward the enormous student bodies of the present era, Mr. James E. Lawrence, the erudite editor of the Lincoln (Nebraska) Daily Star, had the following to say on the problem in the May 4, 1952 issue of the Sunday Nebraska State Journal and Star:

"I am inclined to believe that with few exceptions these fine youngsters thronging American universities and colleges today are more sinned against than sinning. They live in a very confusing world and if they are to look around and about them, they will find not only a disturbing world in terms of political conflict but also a world that seems to have lost its sense of values in moral terms.

"In the professional colleges involving professional training, the emphasis upon a liberal education is apt to become obscure That liberal education in itself to which there is frequent reference is second to none in the contribution which any university makes, even in the training for the highly technical fields, and actually that broad liberal education is the basis for proficiency in specialized fields. We need the best in liberal education more than ever before.

"No man and no woman is fully educated unless those years in the college or the university provide the foundation for a philosophy of living geared to meet the everyday problems which confront people at this time. In the largest sense, there is a right and a wrong fashioned upon acceptable moral standards. There is a justice and an injustice when it comes to human relationships. There is a decency and a lack of decency in the thought and the daily habits which characterize the lives of individuals. There is a sensitiveness to the rapid transitions now affecting huge masses

of people either for good or evil. There is a fierce pride in the heritage of freedom. There is a sense of individual responsibility in the understanding of the system of capitalism to strengthen and fortify it against weaknesses within its own development. There is a tenderness and a fitting dignity that the American wears with becoming grace."

Since this writer first came in contact with pharmaceutical education in the year 1908, he has been aware of the fact that the laymen in his home state were more concerned about the character and the qualifications of the home druggist than the druggist himself was or has been. The first bill that was presented before the Nebraska Legislature, to increase the educational requirement for the practice of pharmacy to a four year college course, was written and introduced by a country banker. The layman of that day, like the layman of today, cannot judge the ability of a pharmacist by the prescription he compounds. He judges his professional ability by qualities which he understands, namely, by the educative process he has undergone, the nature and forcefulness of his character, and the leadership which he manifests for everything that is decent and uplifting in the community in which he lives.

In this issue are printed the by-laws regulating the practice and the procedures of the Conference of Teachers of the American Association of the Colleges of Pharmacy, and also the by-laws for the guidance of the individual sections (five at the present time) constituing the Conference. These by-laws have been approved by the Executive Committee and the Association. They represent an effort on the part of Teachers Conferences, through a number of years, to organize and concentrate so their work would be more effective. The resulting by-laws, we believe, are most commendable. They represent the mature thought of those who have had a part in the work and it is hoped that every member of the teaching faculties will join one or more of the sections allied with his greatest interests. The American Association of Colleges of Pharmacy is an institutional organization in which actions are determined by the institution, but the Conference of Teachers is an organization of individuals within the institutional organization which gives the individual freedom of expression and action which he does not have in an institu-

tional organization. In other words we are getting down to "grass roots" where sound policies have their origin and from where the superstructure gets its food for growth.

Through the courtesy of Dr. Heber W. Youngken, Jr., the Editor has been supplied with some of the views on changes in medical care and medical education recently stated by Dr. Edward L. Turner, dean of the University of Washington School of Medicine. Dr. Turner states the case as follows:

"The impersonalization resulting from dealing with parts of individuals rather than with human beings as a whole, has materially altered the practice of large areas of medicine and the relations between physicians and the public at large. Specialization is essential today and must be considered as one of the permanent readjustments in medicine. However specialization must carry with it a re-emphasis on the patient as a person, a human being considered in his total environment."

Despite specialization there is need he says for "the good family physician who not only examines the patient, but knows the patient's social and economic environment, hopes, frustrations, and disappointments." Dr. Turner also believes that it is important for medical students to come in contact with "the challenge, opportunity and problems" of a physician who conducts a general practice.

"In medical schools", he states, "the students encounter specialists on every side and do not ordinarily come under the guidance of highly qualified general practitioners unless they have the opportunity to serve under such individuals in a short externship." A program providing for such observation has been established at the University of Washington. Senior medical students spend three weeks as externs under the supervision of one of a group of carefully selected general practitioners.

This certainly lends strong support to Dr. Youngken's plan for "externships" or short periods of clinical pharmacy for observation purposes as a worth-while program for pharmaceutical education.

Three outstanding figures, beloved by the thousands that knew them, have passed on during the first half of the current year. To

those who knew each one best has been given the privilege of writing tributes which appear in this issue of the Journal.

Dr. Nellie A. Wakeman was a perfectionist who left her brand indelibly upon every student that passed her way.

Dr. Julius W. Sturmer was a builder of men and institutions. His record of accomplishments at Purdue and at the Philadelphia College of Pharmacy and Science and his activities on the national level place him as one of the outstanding pharmaceutical educators of his day.

Dr. Wallace Werrett Charters belonged to no clan. His interests and activities were cosmopolitan. A study of his record in Who's Who, testifies to the breadth of both. His efforts in life were directed toward discovering what men in specific fields were asked to do and from the knowledge gained, construct a curriculum that would teach a man to do his work more efficiently. A perfectly scientific method of procedure. Fortunately for pharmacy, it became one of Dr. Charters fields of study and as a result we have "The Basic Material for a Pharmaceutical Curriculum" which became the basic guide for curriculum builders since its publication a quarter of a century ago. But his scholorarly achievements are left to those compilations that record the accomplishments of distinguished men It is his personal life and character that we are interested in here. No one was so well qualified to speak of these as one of his "boys". Dean A. B. Lemon, who knew Dr. Charters in his ABC days. We are grateful to Dean Lemon for his tribute that is so real and so complete that all of us, as we read it, live over those inspiring days when the Commonwealth Study was in progress. The service which Dr. Charters rendered to pharmaceutical education will have no end.

We make no apology for printing "A Tribute to Ottmar Eberback" by Dr. Lee Worrell in this issue. The tribute shows how little the average pharmaceutical educator knows about the history of pharmacy in our own country. For example, how many know that the fine pieces of appartus found in almost every laboratory in America bearing the maker's name, Eberback and Son, were the products of the skill of the father and son of this firm, both of whom were druggists? How many know that the elder Eberback estab-

lished the first drug store in Ann Arbor? How many know the University of Michigan depended on this firm for its supply of chemicals and fine apparatus? How many know that manufacturing of fine apparatus developed from the repairing of broken down apparatus. One thing we all did know was that when a fine piece of apparatus was needed and was not on the market, an order for its manufacture by Eberback and Son resulted in a scientifically accurate product at what seemed to us a ridiculously low price. Scientific progress and pharmaceutical education owe much to the father and son. The story of Eberback and Son is one more cog in the unheralded and unsung romance of American pharmacy and one of which their descendants can be justly proud.

RUFUS A. LYMAN

Health Hazard of Electric Vaporizing Devices for Insecticides.—A reprint from the Journal of the American Medical Association, May 24, 1952, Vol. 149.367, bearing this title has been made available under the sponsorship of the Committee on Pesticides. It is of great interest to both student and practitioner. It may be obtained by addressing Secretary Bernard E. Conley, 535 N. Dearborn Street, Chicago 10, Illinois.

The Rutgers Pharmaceutical Congress featuring the theme "Progress Through Knowledge and Mutual Understanding" and sponsored by the Pharmaceutical Extension Division under the direction of Mr. Louis E. Kazin, was held on May 18, 1952. It presented a much needed forum for educators, manufacturers, retailers, wholesalers and the members of the allied health professions to discuss their mutual problems. The fact that there were 445 registrants for the event is indicative of the interest shown and the service future conferences may render.

Notes and News

Alabama Polytechnic Institute.—Dean L. S. Blake attended the meeting of District No. 3 at Gatlingburg, Tennessee, in May.—Rho Chi has initiated seven new members and one pharmacy student was elected to Phi Kappa Phi.—Prof. G. W. Hargreaves has been initiated into Omicron Kappa Delta, men's national honorary leadership fraternity.—The school is now housed in its new building and complete new equipment has been installed. An elaborate dedication ceremony is planned for the fall.

University of Arizona.—Dean Haakon Bang has resigned in order to return as dean to the school of pharmacy of Washington State College.—Dr. Willis R. Brewer, who came to the university in 1949 in charge of the department of pharmacognosy, has been appointed dean to succeed Dr. Bang.—Twenty-eight students visited the plants of Upjohn, Eli Lilly and the Abbott Laboratories in April.—Lincoln Chin and Ray Groomer, pharmacy seniors, have been initiated into Phi Kappa Phi.—Mr. Louis Fischel, of San Francisco and Chairman of the House of Delegates of the American Pharmaceutical Association, was guest speaker at the student branch luncheon on April 25.—Lyman Day, in honor of Dr. Rufus A. Lyman, who was founder and first dean of the college of pharmacy of the University of Arizona, was observed on April 30 in the typical Arizona way at the famous Kinsley Ranch on the Nogales Highway.

University of Buffalo.—Mearl D. Pritchard has been selected by the alumni as their candidate for election to the Board of Trustees (The Council) of the university.—James Buckley, a junior pharmacy student, has been elected president of the University Student Board of Managers which is the highest honor that can come to a university student from his fellow students.—Six hundred and fifty high school students and their parents visited the school of pharmacy's Open House party on March 27 to see the school in action.—The women of the Auxiliary of the Erie County Pharmaceutical Association, who contributed so generously toward the refurnishing of the pharmacy girls' lounge, were entertained at a tea given by the Dean of Women on May 9.—The largest group of Erie County pharmacists ever to attend an association meeting, held jointly with the Erie County Medical Society, was present on April to hear Dean Hugo H. Schaefer discuss the implications of the new Durham-Humphrey Act and regulations pertaining thereto.—The Spring Clinic and Alumni Day sponsored by the school of pharmacy and the alumni association, was held on May 1. Outstanding speakers and their topics were: N. S. Gesolde, "The Outlook for Fair Trade Legislation"; Paul C. Olsen, "Recent Economic and Business Trends of Special Interest to Drug Store Proprietors"; Dean L. F. Tice, "Newer

Medicinals and Their Limitations"; Don E. Francke, "Factors Influencing the Present and Future of Pharmacy"; W. Paul Briggs, "The First Ten Years of the American Foundation for Pharmaceutical Education"; Louis E. Kazin of Rutgers, "Keeping Retail Pharmacists Up-to-Date Through University Extension Service"; and a panel discussion on "What is the Best Answer to Pharmacy's No. 1 Irritant—the Duplication of Manufacturers' Drug Products", moderated by Mearl D. Prichard.

Butler University.—The new four story stone pharmacy building erected on the Butler University campus incorporates some of the most modern equipment in the profession. Among its features are: an intercommunication system reaching all class rooms; a specially constructed distribution panel, which makes it possible to direct A.C. or D.C. current of various voltage to several points where it will be needed for teaching or research; air-conditioned animal rooms, including an isolation ward; private research laboratories; ample space for the development of a manufacturing laboratory; and distilled water piped to all laboratories. The building was formally dedicated on May 7, 1952. The dedication was attended by 300 pharmaceutical leaders from across the country. The dedication ceremony was a challenge to the school in particular and to the pharmaceutical profession in general. The principal speakers were Dr. E. C. Elliott, Dr. R. P. Fischelis and Dr. W. Paul Briggs. Dr. J. B. Burt, chairman of the Executive Committee of the American Association of Colleges of Pharmacy, represented and brought greetings from that organization.

University of Southern California.—Dean Alva G. Hall and Dr. Orville Miller participated in the program of the April meeting of the Greater Los Angeles Branch of the A.Ph.A. Dr. Miller was on the TV program on May 31. His topic was, "Drug Plants of California".—An article, "The Anti-Thyroid Drugs" by Prof. Edward S. Brady appeared in the April number of the Pacific Drug Review. Prof. Brady spoke on "Pharmacy Laws and Professional Ethics" at the April meeting of the Pacific Coast Club and on "Characterization of Essential Oils" at the April meeting of the Flavoring Extract Manager's Association.—A two day "Sales Training Program" was presented by McKesson & Robbins, in May, under the direction of Roland Rasener, lecturer in commercial pharmacy.

University of Colorado.—At the joint meeting of the Southwestern Division of the American Association for the Advancement of Science and the Colorado-Wyoming Academy of Science, held at the University of Colorado in May, Dean Charles F. Poe served as chairman of the Bacteriology Section, and he and Stephen McCulloch presented a paper on, "Reversal of Cobalt and Nickel Inhibitions by Magnesium in Yeast

Cultures". John P. Street gave a paper on, "A Study of the Protective Action of Alkaloids Against Ultraviolet Irradiation", and Dr. Harold C. Heim's paper on, "The Effect of Histamine on the Respiration of Rat Brain" was reviewed.—Dr. Norman Witt, who is also premedical advisor at Colorado, attended the second National Conference Subcommittee on Pre-professional Education of the Survey of Medical Education at Buck Hill Falls, Pennsylvania in April. Dr. Witt, served as an analyst in a section of the meeting designated as the "Advisory System". The conference is sponsored by the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges.—Five new members have been initiated by Rho Chi.—Five awards were made to senior students for outstanding achievements at the annual pharmacy banquet on May 17.

University of Connecticut.—Sixty-two student were graduated on June 8, four with Honors and two with Highest Honors. Two graduate students were granted the master's degree; Margaret L. Adams whose thesis subject was "Biosynthesis of Carbon 14 Labeled Colchicine", and Albert M. White whose thesis was entitled "Calcium Ursolate as an Emulsifying Agent".—The Alpha Gamma Chapter of Rho Chi sponsored the first Annual Honors Day on May 19. Awards were made to seven seniors and five members of other classes.

Duquesne University.—One hundred and three students and faculty members visited the Parke, Davis plant in April.—Dr. Joseph A. Zapotocky has been elected president of the Pittsburgh branch of the A.Ph.A. —Forty-seven seniors were graduated in June. Five seniors were recipients of awards for excellence of scholarship.

University of Florida.—At the February meeting of the Florida Society of Hospital Pharmacists, Dr. S. G. Gramling spoke on new drugs; Prof. Duckworth discussed the responsibility for negligence; Dr. C. H. Becker lead a tour of the manufacturing laboratory; Dean P. A. Foote outlined the plan for graduate work in hospital pharmacy; Dr. W. J. Husa spoke on activated charcoal; and Chas. S. Haupt explained how the Florida Formulary can be used with hospital formularies.—Dean Foote, as the guest of the Polk County Medical Society in March, spoke on "Interprofessional Relations".—Sixty-nine juniors and seniors visited the Parke, Davis Laboratories in April.—A student panel discussion on the new curriculum was held at the Northeastern Pharmaceutical Association meeting in March. Prof. Duckworth discussed the Durham-Humphrey law and Mr. R. Q. Richards reported on the present status of Fair Trade.—Dean Foote and Prof. Haupt took part in a panel discussion of current subjects at the April meeting of the Northwest Florida Pharmaceutical Association.

Fordham University.—Dean James H. Kidder was an A.Ph.A. delegate to the Third National Conference of the United States National Commission for UNESCO held at Hunter College, New York.—One hundred and twenty students made the annual Easter trip to the Eli Lilly and the Parke, Davis laboratories.—Prof. A. J. White spoke twice in April before the American Podiatary Council at Hunter College. His subjects were "Fundamentals of Prescription Writing" and "Incompatibilities of Interest to the Poditrist".—Ninety students were graduated at the June commencement and six were awarded prizes for scholarship.

George Washington University.—Pi chapter of Alpha Zeta Omega has made available a $500 scholarship to be awarded annually to a senior of the graduating classes of the high schools of the District of Columbia. This chapter and the Womans Auxiliary of this chapter each had previously made available a prize of a U. S. Dispensatory to a student of the school, and Kappa Psi has made available scholarship funds in the amount of $75 annually to the school.—Twenty seniors were graduated on May 28. Five were given awards for scholarship.—Franklin Cooper, Master of Science in Hospital Pharmacy from the University of Maryland, will join the hospital pharmacy staff of this university on July 1 and will also serve on the pharmacy staff of the school during the academic year.

University of Georbia.—Henry O. Veale, the university's most outstanding pharmacy student, has been elected valedictorian by the entire student body. He was selected from the five top candidates of the senior class. He had an averape of 96 for his four years work. He is the second pharmacy student in two years who has received the highest scholastic honor on the campus of the university.—Crawford W. Long Day was observed on March 31, 110 years and one day after the discovery of the anesthetic property of ether. Dr. Henry Poes, the guest speaker representing the Medical Association of Georgia, spoke on the subject "A Doctor Looks into the Crystal Globe". Long Day is sponsored by the school and the Rho Chi society.—President Don Francke was the guest speaker at the annual Robert C. Wilson Awards Dinner on April 15. Fourteen students were given awards, prizes or certificates of merit for outstanding scholarship or activities during the year.—Dr. Woodrow R. Byrum has prepared a "Suggested Hospital Formulary" for the Division of Hospital Services, the Georgia Department of Health, Atlanta. The Formulary is currently being circulated to all hospitals in the state. The compilation consists of those essential drugs which should be carried by all small hospitals which are currently being built under the Hill-Burton Act.

Howard College, Birmingham.—Thirty-nine students received the bachelor's degree at the May commencement, nine of whom received

meritorious awards.—Dr. George Valley, research micro-biologist of the Bristol Laboratories spoke on "Recent Trends in Antibiotics" before the student branch in March. He outlined and explained the various steps taken in the large scale manufacture of penicillin.—Mr. A. C. Weatherwax, narcotic inspector for the Birmingham area, addressed the students in May on the topic "The Narcotic Law and Violations of the Law".

University of Illinois.—Construction of the new pharmacy building started on May 6.—Five Seniors were graduated with honors at the June commencement and six were given scholarship awards.

State University of Iowa.—Announcement was made in May of the retirment of Dean R. A. Kuever from administrative duties and the appointment of Prof. Louis C. Zopf as his successor. Dean Kuever was accorded the title of Dean Emeritus and, after a year's leave which was granted him, will continue on the teaching staff. Prof. Zopf has been a member of the Iowa staff since 1928 when he was appointed as drug service pharmacist. He held an assistant professorship from 1934 to 1941 when he became professor in charge of drug service, a positior he currently holds. He is a member of many national scientific societies and honorary professional societies and has become distinguished as teacher, researcher and consultant in his special field. Since 1947 he has been secretary-treasurer of the American Association of Colleges of Pharmacy, a position he has filled with great credit to himself and to the advantage of the Association.

University of Kansas.—Dean J. Allen Reese discussed the Durham-Humphrey Bill before the annual convention of the Kansas State Pharmaceutical Association. He also attended the meeting of District No. 5 at Fargo, North Dakota recently.—J. Robert Campbell and W. Lewis Nobles, pharmacy students, presented papers recently before the Chemistry Section of the Kansas Academy of Sciences.—Scholarship awards and honors were announced at the senior banquet held on May 2.—Eight juniors and one senior have recently been elected by Rho Chi.—Forty-one seniors were graduated at the June commencement and Peter H. Jackson and W. Lewis Nobles, majors in pharmaceutical chemistry, were awarded the doctorate.

University of Maryland.—Fourteen juniors and seniors, eight graduate students and one alumnus, William J. Lowry, 1946, who was the first president of the alumni association when it was organized in 1926, were initiated into Omicron Chapter of Rho Chi on May 15. The guest speaker on the occasion was Lt. Col. Loyd E. Harris of the Army Chemical Center, Edgewood Arsenal, Maryland.—On May 13, Dr. Robert P. Fischelis installed a student branch of the A.Ph.A. in the school. One

hundred and eight students, including six graduate students, became members of the branch. Dr. Fischelis explained the activities of the American Pharmaceutical Association and stated the purpose of the branch is to encourage, in the broadest and most liberal manner, the advancement of science and the profession in accordance with the objectives stated in the Constitution of the American Pharmaceutical Association, especially in fostering education in matters involving pharmacy in all of its branches and applications, and aiding in promoting the public health and welfare. Other speakers on the occasion included Dr. W. Arthur Purdum of the Johns Hopkins University Hospital and Dr. Otto W. Muehlhouse, vice-president of the Baltimore branch of the A.Ph.A.

University of Minnesota.—During the spring quarter special lectures were given to the senior class by A. D. Caswell of the U. S. Bureau of Narcotics; C. Hollin, a certified public accountant; and G. W. Wilharm, a retail pharmacist.—Dr. C. Promas, Rector of the University of Medical Sciences of Thailand, and president of the medical association of that country, was a visitor in May.—Seven seniors and graduate students have been elected to Phi Lambda Upsilon; seventeen seniors, graduate students and one member of the faculty have been elected to Rho Chi; two junior girls have been accepted by Iota Sigma Pi; and nine students have received scholarships, fellowships, and prizes of local origin.—Dr. C. V. Netz and W. J. Bradley were recently reelected member of the executive committee and secretary, respectively, of the Minnesota State Pharmaceutical Association.—On June 11 the seniors were guests of the State Association at a luncheon at Hotel Nicollet.—In May they were guests at a luncheon and an inspection trip through the facilities of McKesson & Robbins at Minneapolis.—In March, 85 students visited the plants of the Upjohn and the Parke, Davis Companies and the Abbott Laboratories.—Several members of the faculty attended the meeting of District No. 5 at Fargo, North Dakota in May.—Dr. E. First, professor of chemical engineering and recent Fullbright Fellow, spoke at the annual Rho Chi dinner. He told of his experiences in Europe during his year of study there.—Open house was held on Pharmacy Day, which was May 14.—Dr. Hamed A. Aushady of Egypt, who received the doctorate during the past winter, is continuing his studies under an Eli Lilly & Company post-doctorate fellowship.

University of Mississippi.—Several members of the staff attended the meeting of District No. 3 at Gatlinburg, Tennessee in May. Dean Hammond presented a paper on "The Responsibility of the Practicing Pharmacist in Educating the Apprentice" and Dr. J. L. Voigt gave one on "Prescriptions Compounded Exactly as Written". Faculty members also attended several recent district meetings of the Mississippi State Pharmaceutical Association.—Six students were given awards for su-

perior scholarship at the June commencement. Thirty-eight seniors received degrees.—The senior class, accompanied by several members of the faculty, visited the McKesson & Robbins, Inc., and the Plough, Inc., plants at Memphis, Tennessee in April.—At the university's Honors Day Convocation awards were made to five pharmacy students for excellence in scholarship for the current year. Mary Patricia Carolyn McNease was the only pharmacy representative among a group of twelve students who were recipients of Taylor Medals, which are granted to students selected by a faculty committee as deserving of recognition for meritorious scholarship and deportment from a list of nominees submitted by the women's division of the university.—Two new members were initiated into Rho Chi on May 6.

State University of Montana.—The maintenance department is assembling the Klett Electrophoresis equipment purchased for the cancer studies by Dr. Muriel Loran.—Several members of the staff attended the meeting of District No. 7 at Spokane in May. Dr. Loran gave a paper on, "Theory and Practice in Teaching of Dispensing Pharmacy".—Thirty-one seniors were graduate on June 9.—Leonard Barnes was granted the master's degree. His thesis subject was, "The Formulation of a New Ointment Base".

University of Nebraska.—Forty junior and senior students made an inspection trip to the Upjohn and Parke, Davis laboratories in May.—Rho Chi initiated nine new members on March 24. The Nebraska chapter cooperated with the Creighton University chapter in presenting a panel discussion on "The Regulation Concerning Practical Experience" at the Nebraska Pharmaceutical Association's annual meeting in Omaha on April 9.—Marvin H. Malone, 51, a graduate student now majoring in pharmacology, has been awarded first place by the Delian-Union Society for his prize winning short story of 1952 entitled, "The Midwestern Epic". The author also won first place in the 1948 and 1950 contests and was given honorable mention for his 1951 story.—Dr. Donald M. Pace was guest speaker at the Lion's Club in April. His topic was "New Methods in Cancer Research".—Fourteen new members were initiated by Kappa Psi in March.—Dean J. B. Burt attended the annual meeting of the Board of Directors of the American Foundation for Pharmaceutical Education in New York City in April and the annual meeting of District No. 2, Boards and Colleges, held at Gatlingburg, Tennessee, in May.—On May 16, approximately 200 faculty members, students and guests attended the annual pharmacy banquet at which numerous prizes were awarded. A skit put on by Kappa Psi and a musical program revealed some excellent talent.

University of New Mexico.—Twenty-five seniors were graduated in June. Three were given awards for scholarship and leadership.—Dr.

H. L. Boyland of Surgical Appliance Industries gave an illustrated lecture in May on "Fitting Surgical Appliances". The lecture was sponsored by Kappa Psi and the class in biological therapy.—Dr. Castle will spend the summer in research and has been granted sabbatical leave for a year at the University of Virginia.—The college presented a booth of new emulsifying agents and pharmaceutical specialties for use in prescription practices at the New Mexico Pharmaceutical Convention in June, and Dean Cataline reported on the college of pharmacy pharmaceutical education, and the changing order in pharmacy.—Dr. Richard A. Deno and Mr. L. D. Bracken inspected the school in March and Dr. E. E. Nelson, chief of the research section of the Federal Drug Administration was also a visitor.—Dean E. L. Cataline attended district meetings of the New Mexico Pharmaceutical Association at Hot Springs, Deming and Silver City during April and March and spoke on the subject of professional relations at Gallup.—Twenty-five students visited the Upjohn and the Parke, Davis Laboratories during the Easter vacation.—Dr. Castle attended the American Chemical Society meeting in Milwaukee, recently.

University of North Carolina.—Forty-six seniors were graduated at the June commencement. Jan. H. H. Beaujon and John W. Martin were granted the doctorate.—Mr. P. Jackson, president of the Emerson Drug Company, was the guest speaker at the Annual Awards Night on May 20, when eleven students were recognized for superior scholarship.—Three new members have been initiated into Rho Chi.—A rotary tablet press and oscillating granulator have been added to the pharmacy equipment.

North Dakota Agricultural College.—Dr. S. S. Chernied, of the department of pharmacology, has been given a United States Public Health Service grant for research on the control of pancreatic enzyme formation. He will receive $7000 annually for three years during the course of the study.—Forty-two students were graduated at the June commencement. One graduate student received the M.S. degree in pharmacology and will register for advanced work in this field at the University of California.

University of Oklahoma.—Dean R. W. Clark and Profs. Ralph Bienfang and J. B. Bruce presented papers at the District No. 6 meeting in Kansas City, Kansas, in May. Their respective subjects were "Interprofessional Relations", "Problems in Pharmaceutical Education", and "Correlation of Professional Subjects in the Pharmaceutical Curriculum". Dean Clark has also recently addressed the Oklahoma School of Medicine; a joint meeting of the Oklahoma Medical, Dental, and Pharmaceutical Associations in Oklahoma City; the nurses meeting in Norman;

and a druggists meeting in Pryor, upon the same subject.—James Stilwell, a pharmacy junior, and Don Clark, son of Dean Clark, were among the 23 university students designated as Distinguished Military Students.—Miss Blanche Sommers, associate professor of pharmacy, has been granted a sabbatical leave for one year beginning September 1, 1952. She has also been awarded a $700 scholarship by Delta Kappa Gamma, national teachers' society and will be engaged in graduate study for the year at Ohio State University.—Eight students have received awards for outstanding service or excellence of scholarship.

Southwestern State College, Oklahoma.—At the April meeting of the Oklahoma State Pharmaceutical Association, the alumni of the school of pharmacy organized a permanent association and elected officers for the current year.—More than 200 faculty members, students and special guests attended the annual banquet of the student branch on March 24.

Oregon State College.—Prof. H. C. Forslund is the newly appointed chairman of the Disaster Committee of the Benton County chapter of the American Red Cross.—At the District No. 7 meeting in Spokane in May, Dean G. E. Crossen presented a paper entitled "Teacher Training for Pharmacy Staff Members" and Prof. Forslund gave a paper on "A Proposed State Board Identification List and Examination Procedure". Collaborating with him was Prof. Sciuchetti and also P. D. Quisenberry of the Oregon Board of Pharmacy.—Over fifty students and faculty members attended the pharmacy banquet sponsored by Rho Chi, Kappa Psi and Lambda Kappa Sigma in May. Skits were presented by each organization.—Phi Kappa Phi recently initiated one senior and three junior pharmacy students. Dean Crossen was one of the three faculty members of Oregon State College to be so honored by the organization for outstanding achievement in his field.—Awards were made to fourteen students for various accomplishments at the annual Pharmacy honors convocation on May 19.

Philadelphia Collepe of Pharmacy and Science.—At a special awards assembly on May 15, forty-four students received recognition for participation in extra-curricular activities.—Robert Pennente has been elected president of Rho Chi, succeeding his older brother, Nicholas.—The college has been asked to give another series of lectures next fall on the VFIL-TV University of the Air Series.—Dr. Adam H. Fiske, Eli Lilly & Company, and John J. Hughes, a member of the Pennsylvania State Board of Pharmacy, have been elected to the Board of Trustees.—The Alumni Reunion Dinner on May 27, was a testimonial to Col. Samuel P. Wetherill, chairman of the Board of Trustees since 1934.

University of Pittsburgh.—Dr. Edward P. Claus was elected president of the Pennsylvania Academy of Science at its April meeting. Dr.

Claus has been a member of the Academy since 1933 and has served both as an officer and committee chairman at various times.—Professional, pharmaceutical, and extra-curricular activities were highlights of a mock convention held recently. The program was sponsored by the Pittsburgh student branch of the A.Ph.A. and was timed to coincide with the annual spring conference and seminar with the Pittsburgh branch of the A.Ph.A. Papers were presented devoted to economic and legislative pharmacy and a review of advances in pharmaceutical research was presented. Winners of scholastic honors were presented and the new members of Rho Chi were introduced and keys were presented to outstanding members of student activities for their contribution to undergraduate student life.

Purdue University.—Dr. Jack Orr, B.S. in Pharmacy in 1940, now at the University of Utah, has been named dean of the school of pharmacy of Montana State University, effective at the end of the current academic year.—Instructor James W. Dow, who has been in charge of the Apothecary, has resigned to enter the retail field and George L. Stanko, B.S. '49, M.S. '52, has been named to fill the vacancy.—Dr. L. D. Edwards, G. L. Jenkins, and C. O. Lee represented Purdue at the dedication of the new pharmacy building on the Butler University campus on May 7.—Twenty-nine students and members of the staff of the University of Saskatchewan from Saskatoon, Canada, visited Purdue on May 5, on their way to visit the Lilly plant at Indianapolis.—Janet Miller, a junior pharmacy student has been elected governor of Women's Residence Halls in a general university poll.

Rutgers University.—The faculty and senior class attended the Rutgers Pharmaceutical Conference, "Progress Through Knowledge and Mutual Understanding", on May 14, which was held on the New Brunswick campus. The conference, which was attended by nearly 500 educators, manufacturers, retailers, wholesalers and members of allied health professions, gave all an opportunity to participate for the first time in a discussion of their mutual problems, objectives and desires.—Eighteen new members were initiated by Rho Chi in April.—Awards for proficiency in scholarship, sports and school activities were made on May 16.—The Eight Annual Seminar Lectures for pharmacists which were held in March, were well attended. The lectures were given by members of the pharmacy staff.

Temple University.—Dr. Frank Eby recently visited Kappa Psi chapters at Ohio Northern, Drake, Nebraska, Oklahoma and Texas universities and installed a new chapter at Ferris Institute.—Four members of the staff presented seminar programs before the Northumberland and the Schuylkill County Pharmaceutical Associations in April—

Dean J. B. Sprowls has been elected president of the Philadelphia Branch of the A.Ph.A. He is also serving as vice-president of Temple's chapter of Sigma Xi.—Prof. Herbert Coke attended the recent meeting of the American Medical Association in Chicago and presented a paper at the Boston meeting of the American Society of Bacteriologists.

University of Tennessee.—Dean H. L. Crowe attended the District No. 3 meeting at Gatlinburg, Tennessee in May. Dr. Karl Goldner was chosen as chairman for the ensuing year.—Howard Hassler, instructor in pharmacy, received the master's degree from Purdue (in the field of hospital pharmacy) in June.—Wm. B. Swafford, instructor in pharmacy, has been promoted to the rank of Lieutenant-Colonel.—Eighty-two students and their wives visited the Parke, Davis laboratories in April.—Rho Chi initiated 14 new members in May.—At the May meeting of the Memphis Chapter of Hospital Pharmacists, Mr. E. W. Rollins, president of the Southeastern Society of Hospital Pharmacists, made the principal address. He spoke on, "Advantages of Being a Member of a Hospital Pharmacy Association".—Dr. Albert H. Musick participated in a panel discussion on pharmacy at the Arkansas Pharmaceutical Convention held in Little Rock in May.

University of Texas.—Seventy seniors were graduated at the June commencement.—The seniors made an inspection trip during the Easter vacation of the Lilly and Abbott laboratories and the Walgreen Company in Chicago, the University of Illinois, the St. Louis College of Pharmacy and the Missouri Botanical Gardens in St. Louis.—Dedication of the new pharmacy building, which is now nearing completion, will be on November 1.—Dr. C. C. Albers attended the meeting of the Board of Education of the United Lutheran Church in America in Washington, D. C., in June.—Dr. Albers has been chosen to represent the pharmacy college on the Committee to Advise the Chancellor in the selection of a president of the university to replace Dr. T. S. Painter, whose resignation becomes effective August 31.—Eight new members have been elected by Rho Chi.—The Annual Hospital Pharmacy Seminar was held in April with Dr. John Davis of the department of pharmacology as the chief speaker.—Dr. Melvin A. Chambers, who has been on leave the past year to continue researches at the Oak Ridge National Laboratories, has resigned his position on the pharmacy staff.—Dr. Daniel P. N. Tsao has also resigned from the pharmacy staff and has accepted an assistant professorship at Oregon State College.—The graduate council of the university has approved the program for the master's degree with a major in Hospital Pharmacy. Two assistant pharmacist internships will be available in September, 1952.

Medical College of Virginia.—The Board of Visitors, the president, and the faculty of the College, on the evening of May 15, presented the first Wortley F. Rudd Memorial lecture. Dr. J. Harold Burn, professor of pharmacology, University of Oxford, England, was the guest speaker.

—At the annual meeting of the Virginia Academy of Science, Dr. R. D. Hughes gave a paper on, "Observations on Speciation in Anoetid Mites". He was also co-author on a paper entitled, "Linkage Studies of Sickling and M,N, and S. Blood Groups". Dean R. Blackwell Smith, Jr., read a paper on, "Toxicological Studies on Zinc and Disodium Salts of Ethylene Bisdithiocarbonates (Diathanes 278 and D14R)."—Prof. F. D. Pitts served on the science talent search committee of the Academy, a group established to develop the interest of high school students in the field of science and to provide scholarships for those found worthy. Prof. Pitts has been appointed director of the Medical Service Corps, Richmond, reserve officers corps schools.—Dr. James Young presented a paper on, Catalytic Hydrogenation Studies on Palladium Charcoal" at the recent meeting of the American Chemical Society in Milwaukee, Wisconsin.—Mr. R. R. Rooke was awarded a master's degree in pharmacy at the June commencement.

State College of Washington.—After forty years of service to the State College, thirty-five as head and dean of the school of pharmacy, Dean P. H. Dirstine's retirement is announced, effective August 1, 1952. A native of Michigan, he moved with his parents to eastern Washington when a small boy and has made that state his home since 1889. He received his preparatory education in Washington schools, his pharmaceutical training in Valparaiso University, became interested in veterinary medicine and received the degree of Doctor of Veterinary Medicine from the state college of Washington in 1912. He immediately joined the faculty of the college as instructor in physiology and therapeutics. He did graduate work at Stanford University and had wide experience in commercial and professional pharmacies in Spokane. In 1917 he was made head and in 1924 dean of the school of pharmacy. Under his guidance the registration has grown from 35 students to approximately 300. Work is now offered leading to the master's and the doctorate. The Dean holds membership in and has been active in local, state and national scientific and professional organizations, is a member of national honorary professional societies, is a member and has been an officer in several fraternal organizations. He has served as chairman of the Public Health Committee of the state college and is now a member of the Washington State Health Council. In 1937 he married Miss Belle Wenz, at that time an associate professor of pharmacy in the state college. On his retirement he plans to hunt and fish and travel and enjoy the company of his grandchildren. A reception was tendered Dean and Mrs. Dirstine on May 24, by the alumni, students and faculty and they were presented with several beautiful pieces of silverware.—Dean Haakon Bang, now of Arizona, has been appointed as Dean Dirstine's successor.

University of Washington.—Mr. M. L. Bracken has given Drug Service a single punch electrically driven Stokes tablet machine. An A. Ross roller mill has also been acquired recently. Drug Service handles

the pharmaceutical needs of all the other divisions of health science group.—Twenty-eight scholarship awards were announced at the annual pharmacy banquet on May 29.—Dr. Heber W. Youngken, Jr., has been appointed to the University Committee on Tracer Elements in Biology.—Field trips have been taken by the seniors to visit several of the local wholesale houses and outstanding prescription pharmacies.—Two pharmacognosy field trips have been made showing drug plant farming and processing.—Dr. L. Wait Rising gave a four day series of lectures to the pharmacists of British Columbia in Vancouver and Victoria during the week of June 8.

Wayne University.—Sixty-two students were graduated on June 12.—Formal dedication of the completely equipped dispensing laboratory, presented to the university by Parke, Davis & Company, was held June 4. The speakers on the occasion were Dr. David D. Henry, president of Wayne and Mr. Harry Loynd, president of Parke, Davis. A bronze plaque was unveiled and the laboratory officially opened. The plaque bears the inscription: "This laboratory has been made available to the College of Pharmacy of Wayne University for the teaching of operative and dispensing pharmacy. It is our hope that those who receive instruction here will acquire, along with knowledge and skill, a heightened regard and respect for their chosen profession. June 1952. Parke, Davis and Company."

University of Wisconsin.—A review of the proposed plan for on-the-job-training for pharmacy students was the main subject of discussion at the meeting of District No. 4, held at the university in April. The plan calls for a four or six months period of "internship" between the pharmacy student's junior and senior years. The remaining months required to make up the apprenticeship year which is now required by most state board, will be completed after graduation. The plan will require the modification of some state laws and Dr. L. W. Busse pointed out that since some states are now in the process of law making as regard apprenticeship practice, the time seems logical for the presentation of the new program. The program plan is the work of the Committee on Curriculum of the American Association of Colleges of Pharmacy and Dr. George Webster, former chairman of the committee, says the plan seems satisfactory to all concerned—the colleges, the boards, and the students.—Ninety students were graduated at the June commencement.

University of Wyoming.—Dr. T. O. King presented a paper on "The Treatment of Experimental Nicotine Poisoning" before the joint meeting of the Denver Branch of the American Federation for Clinical Research and the Rocky Mountain section of the Society for Experimental Biology and Medicine in Denver on March 8.—A group of students visited the Eli Lilly and the Abbott Laboratories in March.—The students prepared a display of drugs used in the treatment of heart disease for exhibit in the Wyoming Student Union for Health Emphasis Week.

Miscellaneous Items of Interest

Memorials

NELLIE A. WAKEMAN
(1883-1952)

On March 23, 1952, there passed away one of those pioneer women teachers whose work, although hardly transcending the local limits of the schools concerned, has done so much for the promotion of pharmaceutical knowledge and education: Nellie A. Wakeman.

She had been a student and throughout the greater part of her life a most faithful assistant to the late Dr. Edward Kremers whom she served with all the devotion which only a female famulus can put into practice in compliance with the demands of a revered master with so little regard for her own accomplishments. It might well be said that to some extent she supplemented Dr. Kremers. It has been stated by those working with both of them, Edward Kremers and Nellie A. Wakeman, especially as to the undergraduate students, that the first gave them the inspiration and the general framework, but that from Nellie they learned the indispensable details in an excellent down to earth manner.

Born on February 20, 1883 in the Town of Sun Prairie as one of the daughters of John and Martha Hatch Wakeman, descendants of pioneer settlers of the Territory of Wisconsin, Miss Wakeman received her Bachelor of Science degree in Pharmacy at the Wisconsin University School of Pharmacy in 1908 and her Master of Science degree in 1910. From 1910-1911 she worked as appointed "Assistant" to Dr. Kremers and held the position as professor of chemistry from 1911-1913 at Mills College, California, continuing during this time her work on her Doctor's thesis. In 1913 she obtained her Doctor of Philosophy degree in pharmaceutical chemistry at the University of Wisconsin.

The topics of her various theses show her scientific development as well as her specialization. She did her Bachelor's thesis on "Thymoquinone and Hydrothymoquinone," her Master's thesis on "The Monardae, a phytochemical study," her Doctor's thesis on "Plant pigments other than chlorophyll." It was the plant pigments to which later on her main endeavor was devoted. In 1913 she was appointed Instructor and in 1927 Assistant Professor at the University of Wisconsin School of Pharmacy. She held this position until her retirement in 1946.

Miss Wakeman was not only a good scientist but liked social intercourse. She held memberships in several scientific, historical and fraternal societies and belonged to the Honorable Order of Descendants of Colonial Governors, the Daughters of the American Revolution, and St .Andrews Episcopal Church.

Various accidents and sickness had made life during the last years rather cumbersome for her. She took it with good grace. An excellent teacher and an exemplary human being she will be well remembered by all who knew her.

Arthur H. Uhl

WALLACE WERRETT CHARTERS

By several strange coincidences Wallace Charters entered and profoundly influenced my life at three different eras. We were born in the same hamlet in Ontario, Canada, but he preceded me by fourteen years. When he was nineteen he took his first teaching job in a little one-roomed school house in the village where I had moved. He taught me my A.B.C.'s and boarded in my grandparents' home where I also resided during the years 1894-95. He then moved on in turn to McMaster College, The University of Toronto, and the University of Chicago, acquiring the Bachelor's, Master's and Doctorate degrees. We were lost to each other from 1895 until 1924 when fate brought us together again on the Commonwealth Study of Pharmacy. For another 24 years we were to have only occasional contact or communication. In August of 1950 he sent an invitation to the 20 living members of his first student body to hold a reunion with him in the original one-roomed school house which is still in use. Fifteen came, and from the same platform that he had addressed us fifty-six years before, he delivered his valedictory. A book of memories of those days presented to him at the reunion contains reference to all of the traits that made him the great man that he became—humble, kind, tolerant, sympathetic, understanding and patient. These traits so essential in a teacher were his in abundance. Successful as were his classroom teaching and the several texts that he wrote, his most valuable contributions to education came as a result of his practical-mindedness. He became our foremost authority on professional curriculum engineering. He argued that the only way to develop a functional curriculum is to determine first what the practitioner does, and around that construct the curriculum to fit him for most efficient performance. The Commonwealth Study of Pharmacy did just that. There are those who maintain that the results of that study, together with Dr. Charters' personal conclusions, did more for the profession of pharmacy than has ever been appreciated. He was the guiding spirit in the

development of higher pharmaceutical standards. He furnished authoritative information of our actual educational needs. It would have been almost impossible to have continued the advance of pharmaceutical education to from 2 to 3 to 4 years of training without the convincing objective information furnished by his study.

As Dr. Charters moved from one institution of higher learning to another, serving sometimes as Dean, sometimes as Professor, sometimes as Research Director and sometimes as Consultant, he left always indelible evidence of his mastery of the engineering prowess necessary for the success of any educational plan involving research and experimentation.

At the Rochester Institute of Technology, where he served as Educational Consultant for twenty-three years, he devised among other innovations a guidance program unmatched on this continent—an experiment which transformed the faculty from a group of teachers of subject matter to a group of leaders of youth.

In 1920, under a grant from the Rockefeller Foundation, he established a Research Bureau at Stephens College and served as its Director until 1948. Here, as elsewhere, he placed emphasis upon intelligent guidance of the individual student. He had a profound respect for individual capacities and promoted the best means for developing such.

Dr. Charters was interested not only in education, but also in religion as a vital integrating force in the lives of individuals. A life long member of the Baptist Church, he was at the time of his death Chairman of the Board of Trustees of the Northern Baptist Convention.

No tribute to Dr. Charters would be complete without some reference to his brilliant family to which he was so profoundly devoted. His wife, his three daughters and son each hold graduate degrees and reflect in their individual ways the rich heritage that is theirs.

And now, while we mourn his loss, we realize that it is only his gracious physical presence that is gone. The great residue of a splendid life, lived in obedience to the highest standards of conscience, of a character sweet and generous and firm, of an excellent work full-rounded and complete remains and will endure. It is of such deposits as that that the tradition of our educational system consists. He has enriched the Spirit of American Education for all time.

A. B. Lemon

A TRIBUTE TO OTTMAR EBERBACH*

Many memorials to Ottmar Eberbach now exist. The triplet firms of Eberbach Pharmacy, Inc., Eberbach & Son Company, and Eberbach Corporation, are a tribute not only to his skill and pride in Pharmacy, his

*Presented by Lee Worrell at the Tenth Spring Conference of the Michigan Academy of Pharmacy, April 30, 1952, on the occasion of the dedication of the Memorial Lecture to Ottmar Eberbach.

chosen profession, but also to a remarkably far-sighted business acumen. The naming of Eberbach School in Ann Arbor in his memory attests a life of civic service. The success and esteem which his children now enjoy in their respective communities are evidence that this busy man knew the enjoyments and accepted the responsibilities of family living as well as those of his profession and of his citizenship.

The Michigan Academy of Pharmacy is tonight commemorating this past leader in Michigan Pharmacy by dedicating to him its tenth Memorial Lecture.

Ottmar Eberbach was born in Ann Arbor on November 23, 1845. His father, Christian Eberbach, who was born in 1817, in Stuttgart, the capital of the kingdom of Wurtemburg in South Germany, was a member of a well-known and well-to-do family of that locality. A small German town bearing the family name, Eberbach, is still in existence. Christian Eberbach was education in the polytechnic school at Stuttgart and received training in pharmacy in the employment of a Doctor Koch. At the age of twenty-one he sailed to America, landing in Philadelphia after a voyage of sixty days. Proceeding almost immediately to Ann Arbor, traveling most of the way on foot he found employment as a clerk in the general store of William S. Maynard and became a resident of what was then a small village. Michigan had been admitted as a state only two years before and the materials for the first University Building were then being accumulated. In 1843 Christian Eberbach established the first pharmacy in Ann Arbor and four years later Emmanual Mann entered into partnership with him. This firm was said to be one of the best equipped in the state. Chistian made semi-annual trips to New York for many years to purchase drug supplies, drug containers, porcelain ware, pill machines and other utensils.

Soon after establishing his business, Christian Eberbach married Miss Margaret Laubengayer, who with her parents had recently arrived in Ann Arbor from Wurtemburg. One of the eight children born to this couple was Ottmar Eberbach, the man we are honoring this evening. The father later served as Mayor of Ann Arbor and was one of the presidential electors of Abraham Lincoln.

Ottmar received his early education in the Ann Arbor schools and spent much of his spare time assisting in his father's pharmacy. At the age of 16 he was sent to Germany by his father for the completion of his formal education. He graduated from the polytechnic school at Stuttgart and then spend about three years at the University of Tiebengen, graduating from the Department of Pharmacy. During this period he established many friendships with German chemists and pharmacists which later proved highly useful when he wished to purchase drugs, chemicals, and apparatus for his business in Ann Arbor.

Returning to America, Ottmar entered his father's business and shortly thereafter, in 1876 when the partner Emmanual Mann retired, he entered into partnership with his father and the firm of Eberbach and Son was established. The scope of the business expanded under Ottmar's influence. He soon began the importation and repair of scientific instruments and laboratory equipment, specializing at first on those supplies needed by high school laboratories. Soon close contacts were established with many scientists at the University who relied on the firm to furnish chemicals, dyes and stains, and instruments imported from Germany. The repair phases of the business gradually developed into the actual manufacture of many different scientific instruments. In an interview in 1920, Mr. Eberbach commented as follows concerning the growth of the manufacturing side of the firm's business:

"In the beginning it was a venture. We started it as a side issue, but we always had faith in it, and we wanted to create a standing for ourselves among the strictly scientific manufacturing concerns. We were moderately successful from the start and grew steadily until in 1907 we found the old quarters all too small. We had either to enlarge our quarters or limit the scope of our endeavor.

"It was the scientific side that made the greatest appeal to me, though as a memorial to my father we have never allowed the strictly pharmic side of the business to deteriorate or stand still. We have kept that side always abreast of the times.

"On expanding the business to the scientific supply line our attention was first directed to the needs of universities, colleges and secondary schools of the country, and gradually we reached out to supplying the needs of industrial laboratories. The growth of the industrial needs department has developed into the most important part of the business, due to the fact that we have developed many appliances and forms of appliances which attracted the attention of the manufacturers. Our motto has always been to give our first consideration to quality of workmanship.

"We are not making the money we would make in a commercial concern on the same investment, but there is a greater satisfaction to be derived by a trained scientific mind in a work of this kind than would be derived from another business, even with the financial returns far greater.

"The real high grade work we do is the individual work, the manufacture of delicate instruments and apparatus, built for individual scientists from their own plans."

While developing and expanding the firm, Ottmar was also very active in Pharmaceutical affairs. He joined the American Pharmaceutical Association in 1869 and later became an honorary life member. The

Proceedings of the Association contain contributions from him dealing with the alkaloidal content of commercial elixirs, crystallization of santonin, and standards for preparations containing colchicine. He is listed among the charter members of the Michigan State Pharmaceutical Association organized in 1882 and served as president of that organization for the year 1900. He was one of the pioneer proponents for state regulation of the practice of pharmacy and was a very active member of the group the work of which culminated in the passage of Michigan's first pharmacy law in 1885. In recognition of his interest in pharmaceutical legislation and of his position within the profession, he was appointed to the first State Board of Pharmacy of Michigan by Governor Russell A. Alger. He served on the board for nine years, part of the time as its president. It is interesting, to note, in view of recent discussions on apprenticeship training, that Ottmar Eberbach on July 13, 1887, presented a paper at the fifth meeting of the Michigan State Pharmaceutical Association in Petosky entitled "Is an Apprentice in a Drug Store Entitled to Receive Instruction in Practical Pharmacy from his Employer?" He made the point that if an employer needed a delivery boy or a porter he should hire an individual for that purpose, but that when he hired an apprentice he should recognize his responsibilities as a preceptor and provide paid time for study and practice in pharmacy.

In addition to his professional activities, Ottmar was extremely interested in the civic affairs of Ann Arbor. He served as a member of the Ann Arbor Board of Education for twenty-one years, and as previously mentioned, Eberbach School was named in his honor. He was a member of the original board of directors of the musical society which developed into the University of Michigan School of Music and was a member of the Ann Arbor Zither Club in 1898. The anti-tuberculosis society of Ann Arbor utilized his services as treasurer for many years and he was a member of one of the city charter commissions.

In 1870 he married Catherine Haller in Ann Arbor and of their six children, five are now living.

Ottilie (Mrs. Philip Schaupner) lives in the Detroit area.

Oscar was associated with his father in business and is now (President of Eberbach Pharmacy, Inc.) in Ann Arbor.

Elsa (Mrs. Samuel P. Weaver) lives in Spokane, Washington.

Dr. Carl W., formerly associated with the medical staff of the University, is now Chief-of-Staff of the Department of Surgery at Marquette University and a well-known surgeon in Milwaukee.

Linda E. is a teacher in Ann Arbor High School.

Mr. Eberbach died of pneumonia in St. Joseph's Hospital, Ann Arbor, on January 15, 1921, at the age of 76. His full and active life should certainly serve as an example and inspiration for the presently active members of his profession.

MINUTES OF THE ANNUAL MEETING (1952) OF THE AMERICAN INSTITUTE OF THE HISTORY OF PHARMACY (AN ABSTRACT)

The 1952 Meeting was held at the University of Wisconsin on April 22 with twenty-three members in attendance.

President Arthur H. Uhl in his address voiced the opinion that the year now closed will be marked "as the most fundamental one" in the history of the organization for the fact that for the first time machinery has been set up "to place the Institute on a firm financial foundation" by establishing a Sponsoring Committee under the leadership of one of the best known men in American Pharmacy on the whole, Dr. George Beal of the Mellon Institute.

Dr. Uhl referred to the retirement of the Director of the Institute, Dr. George Urdang, from formal teaching at the Univesity of Wisconsin because of the Univesity regulations concerning the age limit (70 years) of the teaching staff. He expressed the conviction that this fact "will not affect the general character of the work being done", but will permit Dr. Urdang "to give full attention to research and writing along with the direction of the Institute."

Finally Dr. Uhl paid tribute to the Secretary of the Institute, Glenn Sonnedecker for his work on the establishment of the "Urdang Medal", an international award for accomplishments in the history of pharmacy to be put into being on June 13, Dr. Urdang's seventieth birthday.

Secretary Glenn Sonnedecker expressed the Institute's gratitude to the prominent fifteen men listed below who graciously and "usually enthusiastically" agreed to act as the Intsitute's Sponsoring Committee:

George D. Beal, Director of Research, Mellon Institute of Industrial Research

J. O'Neil Closs, Executive Secretary, American Pharmaceutical Manufacturers' Association

Roy Bird Cook, Secretary, West Virginia Board of Pharmacy

Frederick J. Cullen, Executive Vice-President, Proprietary Association of America

John W. Dargavel, Executive Secretary, National Association of Retail Druggists

Robert P. Fischelis, Secretary and General Manager, American Pharmaceutical Association

Guy Stanton Ford, Executive Secretary, American Historical Association

Carson P. Frailey, Executive Vice-President and Secretary, American Drug Manufacturers Association

Ivor Griffith, President, Philadelphia College of Pharmacy and Science

Theodore G. Klumpp, President, Winthrop-Stearns, Inc.

E. Allen Newcomb, Executive Secretary, National Wholesale Druggists Association

Ray C. Schlotterer, Executive Secretary, Federal Wholesale Druggists Association.

Robert L. Swain, Editor, **Drug Topics** and **Drug Trade News**

Arthur H. Uhl, Dean, School of Pharmacy, University of Wisconsin

Charles R. Walgreen, Jr., President, Walgreen Drug Stores, Inc.

There are now about 450 active members of the Institute, a substantial part of them holding "trial memberships offered to those who contributed with especial generosity to the George Urdang Medal fund." A pamphlet "The America Institute of the History of Pharmacy—Its First Decade" has been issued to serve "as a stimulus and invitation to membership." The Secretary extended "warmest thanks" to a number of members "who voluntarily added some contribution to their regular membership dues", and to the fellows of the American College of Apothecaries for their help in the establishment of the George Urdang Medal.

Mr. Sonnedecker finally reported that a membership certificate in the form of "a pocket membership card" has been decided upon and will be put to trial. He stressed furthermore the necessity of permanent clerical help.

Mr. H. Dretzka, the Treasurer, gave his report showing a cash balance of $1,882.28 for March 31, 1952, total receipts in the fiscal year (from April 1, 1951 through March 31, 1952) being $2,537.93.

The Director, George Urdang reported about:

1. The tenth anniversary of the Institute celebrated at Madison, Wis. on May 10, 1951 and centering around a "Conference" devoted to "The History of the Application of Science in the Health Field";

2. The papers presented as contributions of the Institute at the A.Ph.A. meeting at Buffalo on August 29 and 30, 1951 (seven);

3. The contributions of the Institute to its members (seven);

4. Various activities of the Director;

5. Historical pages published monthly in the **American Professional Pharmacist;**

6. Future plans, referring especially to the series on the history of pharmacy in the individual states of the Union and the series on the history of pharmacy in the individual Latin American countries and to the "Contributions from the Department of the History of Pharmacy, School of Pharmacy, University of Wisconsin".

Representation of the Institute in the House of Delegates of the A.Ph.A. After Dr. Urdang had declined the nomination as delegate and urged that this distinction should be given to a younger man, Glenn

Sonnedecker was nominated as delegate and Alex Berman as alternate. The motion was unanimously carried.

Glenn Sonnedecker, Secretary

Note: A copy of the unabridged minutes can be obtained upon request from the American Institute of the History of Pharmacy, Chemistry Building, Madison, Wisconsin.

FOUNDING OF AN INTERNATIONAL ACADEMY OF THE HISTORY OF PHARMACY

(Académie Internationale d'Histoire de la Pharmacie)

Early this year about fifty prominent scientific representatives of the history of pharmacy in about twenty countries, mostly university teachers, agreed on the founding of an International Academy of the History of Pharmacy. In their opinion such an institution will be of great importance for the scientific pursuit of the history of pharmacy, hence for pharmacy at large.

The "Academy" has its seat in The Hague (Holland), the place that has become traditionally connected with the idea of peaceful cooperation of all peoples of the world. The official language is French, with English, German and Spanish as permissible substitutes or supplements.

The "Academy" is, in accordance with the common definition of this term, neither a teaching institution nor a private association of people joining on their own volition. It stands quite by itself, completely independent from all private organizations of whatever kind, and its particular tasks exclude every competition with them. The statutes of the "Academy" state as its main purpose "to stimulate international cooperation in the history of pharmacy and, in particular, to act as a pharmaceutico-historical Upper House". That includes the pursuit of projects of international importance recognized as such or initiated by the "Academy" and asking for cooperative work by experts of the caliber as warranted by membership in the "Academy". Special emphasis is laid on the "Upper House" functions of the "Academy" which undoubtedly will exert a definite influence on the place given to the history of pharmacy as an academic branch of science in the higher institutions of learning all over the world.

A further aim is the establishment of a library serving the students of the history of pharmacy and of respective archives.

Following the customary rules of academics in other fields, the statutes of the International Academy of the History of Pharmacy provide for a limited number of members, new members to be elected by the old ones in case of a vacancy by death or resignation whereby suggestions may be made from outside as well as inside of the "Academy". This method secures a membership comprising only men of generally recognized importance, simultaneously making election to the "Academy" an honor of international meaning.

The official founding date is the thirteenth of June, 1952. This date was chosen in honor of George Urdang, Professor of the History of Pharmacy at the University of Wisconsin, U.S.A., who is celebrating his seventieth birthday on this day. For the same reason the statutes bestow on Urdang the first term of office as President of the "Academy" (otherwise rotating every three years) for the time up to December 31, 1955. Simultaneously he is honored with the choice and appointment of the first members of the "Academy" which has to be taken care of by December 31, 1952.

The start of the "Academy" was made possible financially by donations of numerous interested individuals and pharmaceutical organizations. For the future the income is supposed to come from contributions of the countries represented in the membership. It is hoped, furthermore, that the "Academy" will find in its sphere the support which its sister organizations in other fields are enjoying.

The address of the "Academy" is: Alexanderstrast 11, The Hague, Holland. The office of Secretary is held by Dr. P. H. Brans, Heemraadssingel 122, Rotterdam-C., Holland.

The Chairman of the Founding Committee, George Edmund Dann, Lecturer in the History of Pharmacy, University of Kiel, Kiel (Germany).

DR. GEORGE URDANG RETIRES

MADISON—The establishment of a George Urdang Medal and other honors came to Dr. George Urdang at a dinner Friday night (June 13) on his 70th birthday, which marked his retirement from the pharmacy faculty of the University of Wisconsin. About 130 friends and colleagues were present to pay tribute to the man who gained international renown for his contributions to pharmacy and historical scholarship.

A highlight of the after-dinner program was the announcement by Professor Marshall Clagett, chairman of the history of science department, of the establishment of the Medal as an international award. "The Medal will be bestowed at irregular intervals," Professor Clagett explained, "for original and scholarly works pertaining primarily to historical or historico-social aspects of pharmacy appearing anywhere in the world." The first Medal to be cast was given to Mrs. Urdang

at the dinner as a memento of the occasion. Contributions from about 750 Wisconsin pharmacists and members of the American Institute of the History of Pharmacy and the American College of Apothecaries made it possible to create the Medal.

Two international organizations in historical pharmacy were also brought into being on Dr. Urdang's birthday, it was announced by Arthur H. Uhl, dean of the School of Pharmacy. An International Academy of the History of Pharmacy will henceforth give recognition to, and stimulate collaboration among, the world's outstanding historians of pharmacy. A World Organization of Societies of Pharmaceutical History will provide a common meeting ground for associations, to promote research, teaching and the exchange of information in the field to which Dr. Urdang has dedicated his life. The organizational work for the Academy and the World Organization was carried out by Continental colleagues, particularly in the Benelux countries.

In Washington, D. C. the "Exhibit of the Month" for June at the Armed Forces Medical Library honors Dr. Urdang, who is an honorary consultant to the Library. The exhibit of publications and pictures was described at the dinner last night by Morris C. Leikind, chief of the Division of Historical Research in the Medical Museum of the Armed Forces Institute of Pathology.

Other honors that came to Dr. Urdang on his 70th birthday include honorary membership in the Pharmaceutical Society of Great Britain and the dedication to him of a special issue of a German journal, the **Pharmaceutische Zeitung.** Dr. Urdang was one of the editors of this widely known journal for fifteen years, before coming to this country in 1938 because of the Hitler regime.

At the conclusion of the dinner program Dean Uhl presented Dr. Urdang with a book of personal messages and pictures from a group of his colleagues.

Contributions of Dr. Urdang on the University of Wisconsin campus were described by L. E. Luberg, representing President Edwin B. Fred, who was out of the city; Mark H. Ingraham, dean of the College of Letters and Science; Conrad A. Elvehjem, dean of the Graduate School; and Glenn Sonnedecker, representing the students of Dr. Urdang. K. Heinrich Knappstein, German General Consul of Chicago, spoke on behalf of Dr. Urdang's colleagues abroad.

Although Dr. Urdang retires, because of an age regulation, from the University faculty, it is expected that he will remain on the campus to continue as director of the American Institute of the History of Pharmacy.

THE GEORGE URDANG MEDAL: PRINCIPLES OF ADMINISTRATION

The following principles shall guide the administration of the George Urdang Medal, established June 13, 1952, on the occasion of the 70th

birthday of Dr. George Urdang, at the initiative of the University of Wisconsin pharmacy faculty and the officers of the American Institute of the History of Pharmacy, with the support of Wisconsin pharmacy and Dr. Urdang's colleagues and admirers in the United States and other countries.

1. The George Urdang Medal is intended to honor, in perpetuity, the achievement of Dr. Urdang as a man and scholar and to promote research, publication and interest in the field of work to which he has dedicated his life.

2. The administration of the Medal is to be under the direction of the Pharmacy faculty of the University of Wisconsin and the council of the American Institute of the History of Pharmacy.

3. A Committee on Awards is to be appointed by the administrative agency, or by its designated representatives. Committee members shall be appointed from among those qualified to evaluate critically the publications to be considered.

4. Each year the Committee on Awards is to consider possible recipients of the Medal; however, it is not intended that an award must be made each year. The award may be made at irregular intervals and only when one of the candidates offers work clearly exhibiting the superior quality and distinctive significance that the Medal is intended to promote and recognize.

5. The Medal is to be awarded for an original and scholarly publication or series of publications (including manuscripts) pertaining primarily to historical or historico-social aspects of pharmacy, appearing anywhere in the world. Evaluation is to be based on competence of research and power and skill of interpretation and presentation. (This does not preclude the consideration of popular works primarily intended to achieve more widespread and better understandings of, and appreciation for, pharmacy and its past among members of the pharmaceutical profession, allied professions or the public.)

6. It is intended that an adequate invested fund shall be maintained to provide income for awarding the George Urdang Medal in perpetuity. Any income in excess of the cost of the administrative agency, to add to the capital invested, to help support a presentation ceremony, to provide an honorarium or certificate of honorable mention to co-authors, or to help support publication or translation of worthy works that have been recognized by the medal award.

7. These principles of administration have been approved by the council of the American Institute of the history of Pharmacy and the pharmacy faculty of the University of Wisconsin. They may be amended by a two-thirds affirmative vote of either group concurred in by a two-thirds vote of the second group.

AMERICAN FOUNDATION FOR PHARMACEUTICAL EDUCATION*

1450 BRODAWAY, NEW YORK, N. Y.

L. D. Barney, President, Hoffman-LaRoche, Inc.; Francis C. Brown, President, Schering Corporation; W. Rutherford James, President, Towns & James, Inc.; Harry J. Loynd, President, Parke, Davis & Company; and W. G. Malcolm, President, Lederle Laboratories Division of American Cyanamid Co., were elected Directors of the American Foundation for Pharmaceutical Education at the Annual Meeting held today in New York.

James J. Kerrigan, President, Merck & Co., Inc., Edgar S. Bellis; J. Mark Hiebert, Vice President, Sterling Drug, Inc.; and Robert L. Swain, Editor, Drug Topics, were re-elected to five year terms as Directors.

H. A. B. Dunning, Chairman of the Board of Hynson, Westcott & Dunning, Inc., was elected President; Robert L. Swain, Vice President; Howard B. Fonda, Senior Vice President, Burroughs Wellcome & Co., Inc., Treasurer; James F. Hoge, of Rogers, Hoge & Hills, Counsel; and W. Paul Briggs, Secretary and Executive Director.

Charles J. Lynn, retired Vice President of Eli Lilly & Company was re-elected a member of the Board of Grants; and Robert Lincoln McNeil, Chairman of the Board of McNeil Laboratories, was newly elected to the Board.

Continuing members of the Board are Ernest Little, former Dean, College of Pharmacy, Rutgers University; Dr. A. J. Brumbaugh, President, Shimer College; and Chairman Dr. Guy Stanton Ford, former President, University of Minnesota, Secretary, American Historical Association.

Elected members of the Executive Committee are C. S. Beardsley, retiring President of the Foundation and Chairman of the Board of Miles Laboratories, Inc.; George V. Doerr, Vice President, McKesson & Robbins, Inc.; Howard C. Newton, Dean, Massachusetts College of Pharmacy; Hugo H. Schaefer, Dean, Brooklyn College of Pharmacy; and Robert L. Swain, Editor, Drug Trade News.

The Foundation, incorporated in 1942, celebrated its tenth anniversary with a luncheon at the Hotel Biltmore, attended by the Members, Directors and Patrons.

Dr. Henry Townley Heald, Chancellor of New York University, addressed the luncheon, speaking on the importance of maintaining freedom in education.

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*Press release by W. Paul Briggs of the April 24, 1952 meeting of the Foundation held in New York City.

A budget of $200,000 in support of the various projects of the Foundation in the area of pharmaceutical education was approved for the next fiscal year.

The Board of Grants reported that 35 new graduate Fellowship awards were made during the past year. Also, 71 graduate Fellowships were renewed. The total of 106 graduate Fellows, supported by the Foundation, are studying in 32 universities.

A new program of Teaching Fellowships in Business Administration was approved at the Annual Meeting.

The Foundation is supported by 140 Patrons in the manufacturing drug, pharmaceutical, proprietary, chemical, surgical dressing, cosmetic container and related industries; the wholesale drug trade; independent and chain drug stores, the pharmaceutical press; and the producers of commodities usually supplied through retail pharmacy.

The Association Members of the Foundation are:

American Association of Colleges of Pharmacy
American Drug Manufacturers' Association
American Pharmaceutical Association
American Pharmaceutical Manufacturers' Association
Federal Wholesale Druggists' Association
National Association of Boards of Pharmacy
National Association of Chain Drug Stores
National Association of Retail Druggists
National Wholesale Druggists' Association
The Proprietary Association

Directors continuing in office are:

C. S. Beardsley, Chmn. of the Board, Miles Laboratories, Inc.
Alvin G. Brush, Chmn. of the Board, American Home Products Corporation
Joseph B. Burt, University of Nebraska
George V. Doerr, Vice Pres., McKesson & Robbins, Inc.
J. Preston Levis, Chmn. of the Board, Owens-Illinois Glass Company
Hugo H. Schaefer, Long Island University
Howard C. Newton, Massachusetts College of Pharmacy
S. B. Penick, Sr., Chmn. of the Board, S. B. Penick & Company
R. C. Schlotterer, Federal Wholesale Druggists' Association
John G. Searle, President, G. D. Searle & Co.
George F. Smith, President, Johnson & Johnson
Ernest H. Volwiler, President, Abbott Laboratories
Charles R. Walgreen, Jr., President, Walgreen Drug Stores
George L. Webster, University of Illinois
Carl Willingham, National Association of Chain Drug Stores
Louis C. Zopf, University of Iowa

BY-LAWS REGULATING THE PRACTICES AND PROCEDURES OF THE CONFERENCE OF TEACHERS OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

Article I
NAME

The name of this organization shall be The Conference of Teachers, hereinafter referred to as "The Conference" of the American Association of Colleges of Pharmacy, hereinafter referred to as "The Association."

Article II
OBJECTIVES

The aim shall be to unite all teachers in any branch of Pharmacy in America in the following objectives:

(1) To provide opportunities among its members for the exchange of information, ideas, and techniques in the field of pharmaceutical education.

(2) To study the courses in pharmacy offered in the member colleges of the Association for the purpose of constructive criticism.

(3) To encourage research in pharmaceutical education.

(4) To make recommendations to the Association in matters which affect the teaching of Pharmacy or any branch thereof in the member colleges.

(5) To encourage in the broadest and most liberal manner the advancement of the teaching methods of pharmacy in all its branches; the improvement of the qualification and usefulness of teachers of Pharmacy through development of high standards of professional ethics and education; and by its professional contacts, reports, discussions, papers, and meetings maintain pharmaceutical education at a high level.

Article III
COMPOSITION OF THE CONFERENCE OF TEACHERS

The Conference shall be composed of recognized "Sections" as outlined in Article IV. It shall have a governing body designated as the "Committee on Conference of Teachers," hereinafter referred to as "The Committee," which in addition to such duties as may be prescribed by the Association, shall act as an Advisory Body.

Article IV
MEMBERSHIP

Sec. 1. Members.

The membership of the Conference shall consist of individuals in the respective Sections interested in the objectives of the conference. A member must meet the qualification set up by the membership committee of the Section.

Sec. 2. Procedure for Membership.

Prospective members shall fill out a membership form furnished by the Secretary-Treasurer of the Conference and shall designate the Section or Sections in which enrollment is desired.

Sec. 3. Definition.

Members of the Conference with a common interest in a particular field of the Conference, upon authorization by the Committee on Teachers' Conferences, may organize a group to be known as a Section of the Conference.

Sec. 4. Recognized Sections.

The recognized Sections to date are (1) Biological Sciences, (2) Chemistry, (3) Graduate Instruction, (4) Pharmacy Administration, (5) Pharmacy.

Sec. 5. Government.

Each Section shall make by-laws for its own government which shall be subject to the approval of the Committee and not inconsistent with the by-laws of the Conference. Such by-laws shall be submitted to the Committee, through the Secretary-Treasurer of the Conference, for approval.

Sec. 6. Officers.

A Section shall elect its own officers and representative to serve on the Committee. All selections for officers and changes in office shall be designated promptly by the Secretary of the Section to the Secretary-Treasurer of the Conference.

Sec. 7. Recommendations.

No Section or Committee thereof or Section officer acting in his official capacity shall issue any resolution or statement or take official action on matters affecting the Conference without approval of the Committee except as resolutions, recommendations, or statements transmitted to the Conference through the Resolutions Committee.

Sec. 8. Finances.

(a) A Section shall not assess its members.

(b) A Section shall receive one dollar from the Conference for each member of the Conference indicating enrollment in said Section.

(c) A Section shall receive a share of the Conference funds apportioned upon the total number of members of the Conference enrolled in said Section.

(d) A Section may receive donations or contributions made to said Section and may expend or invest the same in the interest of said Section at the discretion of its governing body. The receipt and expenditure of such funds must be accounted for in the Section report to the Committee.

Sec. 9. Meetings.

(a) Any meeting of a Section of the Conference shall be open to all Members of the Conference on the same basis as the members of the said Section except the privilege of taking part in the government of the Section which is denied.

(b) A Section shall hold an Annual Meeting at such a time and place as to form a part of the program of the Conference. More than

one session may be held at the time of the Annual Meeting, at the discretion of the officers of the Section.

Sec. 10. Reports.

A Section at the close of its meetings shall submit to the Committee an annual report of its operations including an itemized statement of receipts and expenditures and investments of its funds.

Article V
COMMITTEE ON CONFERENCE OF TEACHERS

Sec. 1.

The deliberative body of the Conference shall be known as the Conference of Teachers.

Sec. 2.

The Committee on Conference of Teachers shall consist of a representative of each of the recognized Sections of the Conference and the Secretary-Treasurer of the Conference.

One representative shall be elected initially by each of the five Sections, viz.: Pharmacy, Pharmacy Administration, Chemistry, the Biological Sciences, and Graduate Instruction and shall serve for terms of two years with the Sections on Pharmacy, Pharmacy Administration, or any new Section electing members in even-numbered years and the Sections on Chemistry, Biological Sciences, and Graduate Instruction electing members in odd-numbered years.

A representative of the Association shall be appointed by the President of the Association and shall serve for a term of one year.

The Secretary-Treasurer of the Conference shall be elected for a term of three years by the Committee on Conference of Teachers and at the time of election, may or may not be a member of the Committee but shall be a member of the Conference. He shall also serve as Secretary-Treasurer of the Committee.

Sec. 3.

The members of this Committee shall elect for a term of one year one of their members to serve as Chairman, and one to serve as Vice-Chairman.

Sec. 4.

The members of the Committee shall be responsible for reporting the activities of their respective Section to the Conference when such a report is called for by the Chairman.

Article VI
OFFICERS

Sec. 1.

The officers of the Conference shall be a Chairman, a Vice-Chairman, and a Secretary-Treasurer.

Sec. 2.

The officers of the Committee on Conference of Teachers shall constitute the officers of the Conference.

Article VII
DUTIES OF OFFICERS

Sec. 1.

The duties of the Chairman, Vice-Chairman, and the Secretary-Treasurer shall be such as usually pertain to their respective offices, and also any other duties which may be designated in the By-laws or which may be properly prescribed by the Conference.

Article VIII
COMMITTEES

Sec. 1. Standing Committees

The Membership Committee, the Program Committee, the Resolutions Committee, the Auditing Committee, and the By-laws Committee shall constitute the standing committees of the Conference and shall be appointed from the membership by the Chairman.

Sec. 2. Membership Committee

The Vice-Chairman of the Conference shall be the Chairman of the Membership Committee. There shall be three other members, each to serve for three years, one to be appointed each year by the Chairman of the Conference.

It shall be the duty of this Committee to set up qualifications for membership in the Conference, and to prepare membership forms to be supplied to the Secretary-Treasurer.

The Committee shall prepare yearly a directory of the membership in the Conference which shall contain such information as the Committee deems important. This directory shall be furnished to all members of the Conference.

Sec. 3. Program Committee

The Secretary-Treasurer of the Conference shall be the Chairman of the Program Committee. There shall be two other members appointed each for four years, one every other year.

Sec. 4. Resolutions Committee

The Resolutions Committee shall consist of three members of the Conference, one of whom shall be designated as the Chairman.

The Committee shall study and transmit to the Association any recommendations emanating from the various Sections of the Teachers' Conferences.

Sec. 5. Auditing Committee

The Auditing Committee shall consist of two members, one of whom shall be designated as Chairman. The Committee shall audit the Secretary-Treasurer's report annually.

Sec. 6. By-laws Committee

The By-laws Committee shall consist of three members, one of whom shall be designated as Chairman. It shall be the duty of this Committee to consider all proposed amendments to the By-laws and report its recommendations to the Conference.

Article IX
MEETINGS

An annual meeting of the Conference shall be held at such a time and place as to form a part of the program of the Annual Convention of the Association. More than one session may be held at the time of the annual meeting at the discretion of the officers.

Article X
FINANCES

Sec. 1. Dues

(a) Each member of the Conference shall pay, in advance, to the Secretary-Treasurer of the Committee on Teachers Conferences yearly dues of $1.00.

(b) The dues include enrollment in the Section on Graduate Instruction and one other Section in his or her field of specialization.

(c) A member of the Conference may become a member of a Section other than outlined in (b) at any time by the payment of an added $1.00 fee for each Section, each year.

Sec. 2. Non-payment of Dues.

Every membership in arrears for a period of six months after the first of the fiscal year shall be dropped from the membership rolls. Any person whose name has been dropped from the roll of members for non-payment of dues may be readmitted after having again made application in regular form, the application being accompanied by the usual fee or he may be readmitted without such application on payment of all back dues.

Sec. 3. Association Contributions

The Association contributes a sum not to exceed fifty dollars ($50.00) annually to the Conference for the purpose of defraying necessary expense incidental to the meetings of the several Sections and the Committee.

Sec. 4. Other Contributions.

The Secretary-Treasurer of the Conference is authorized to receive contributions from interested persons or parties to provide additional funds for the activities of the Conference.

Sec. 5. Fiscal Year

The fiscal year of the Conference shall be the period from August 1 to July 31.

Article XI
AMENDMENTS

Sec. 1.

Any proposal for amendment to these By-laws shall be presented in writing over the signatures of not less than ten members of the Conference not less than eight weeks in advance of the Conference meeting to enable the Secretary-Treasurer to forward such proposal to the Committee on By-laws whose duty it shall be to consider the same

and report its recommendations at the next meeting of the Conference. The proposed Amendment shall be voted upon at the last session, which may also be the first, of the annual meeting.

Sec. 2.

An affirmative vote of two-thirds of the members present shall be required to effect an amendment of these By-laws.

BY-LAWS OF THE SECTION OF TEACHERS OF..... A SECTION OF THE CONFERENCE OF TEACHERS OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

Article I
NAME

The name of this organization shall be the Section of Teachers of ....., hereinafter referred to as "The Section" of the Conference of Teachers, hereinafter referred to as "The Conference," of the American Association of Colleges of Pharmacy, hereinafter referred to as "The Association."

Article II
OBJECTIVES

(The Section may simply state that "The objectives of the Section shall be the same as those in Article II of the By-laws of the Conference," or quote or paraphrase some of the wording of the By-laws; Article II, or compose an original statement.)

Article III
MEMBERSHIP

Sec. 1. Members

The Membership of the Sections shall be composed of those members of the Conference of Teachers who designate said Section on the Membership form furnished by the Secretary-Treasurer of the Conference and who have met the qualifications as set up by its Membership Committee.

Sec. 2

Only members of the Section have the privilege of taking part in the government of the Section. Any member of the Conference may attend the Section meetings and participate in its programs.

Article IV
OFFICERS

Sec. 1.

The officers of this Section shall be a Chairman, a Vice-Chairman and a Secretary-Treasurer.

Sec. 2.

The Section shall elect a representative for the Committee on Conference of Teachers as provided in the By-laws of the Conference.

Article V
ELECTION OF OFFICERS AND TERMS OF OFFICE

Sec. 1.

The officers of the Section shall be elected at the Annual Meeting of the Section.

Sec. 2.

The Chairman shall appoint a Nominating Committee of three members before six months of his term has elapsed. At the annual meeting, this Committee shall report one name from among the membership for each elective office to be filled at the time provided for this report in the order of business. The chairman shall call for and receive proper nominations, which may be made from the floor, for any or all offices to be filled at the time.

Sec. 3.

The terms of office for the Chairman and the Vice-Chairman shall be for one year or until their successors shall have been duly elected. The term of office of the Secretary-Treasurer shall be for three years or until his successor shall have been duly elected.

Article VI
DUTIES OF THE OFFICERS

Sec. 1. Chairman

The Chairman of the Section shall preside at all sessions. He shall open the Annual Meeting with introductory remarks as to the program for the session and may include recommendations for the improvement of the Section. He shall appoint committees not otherwise provided for in the By-laws. In case of decease, resignation, or incapacity of any officer or committee member, he may fill such vacancy by appointment but no such appointment shall extend beyond the next annual Meeting of the Conference.

Sec. 2. Vice-Chairman

The Vice-Chairman shall assume the duties of the Chairman in the event of decease, resignation, or incapacity of the Chairman. He shall be Chairman of the Committee on Membership.

Sec. 3. Secretary-Treasurer

The Secretary-Treasurer shall keep a record of the minutes of the sessions of the Section.

He shall keep a record of all income and disbursements of the Section and submit this record to an Auditing Committee at each Annual Meeting.

He shall be responsible for the maintaining of a list of the members of the Section.

He shall prepare and deliver a written annual report on the activities of his office to be submitted to the Committee on Conference of Teachers.

He shall, with the consent of the authors, submit all suitable papers and abstracts of discussions presented to the Section to **The American Journal of Pharmaceutical Education**.

He shall transmit, in proper form, all recommendations passed by the Section to the Secretary-Treasurer of the Conference.

He shall be Chairman of the Program Committee.

Article VII
COMMITTEES

Sec. 1. Standing Committees

The following standing committees are to be appointed from the Section membership by the Chairman:

1. Committee on Program
2. Committee on Resolutions
3. Auditing Committee

Sec. 2. Committee on Program

The Secretary-Treasurer of the Section shall be the Chairman of the Committee on Program. There shall be two other member of this Committee appointed each for four years, one every other year, by the Chairman of the Section.

Sec. 3. Committee on Resolutions

The Chairman shall appoint from the Section a Committee of three members, one of whom shall be designated as Chairman, for the purpose of studying recommendations presented in the various reports.

Sec. 4. Auditing Committee

The Chairman shall appoint from the Section a Committee of two members, one of whom shall be designated as Chairman, for the purpose of auditing the Secretary-Treasurer's report.

Sec. 5. Special Committees

Special committees may be appointed from time to time for special purposes upon recommendation of the Chairman or standing committees or upon motion from the floor. The Committee shall be appointed by the Chairman.

Article VIII
MEETINGS

The Annual Meeting of the Section shall be held at such time and place as to form a part of the program of the Conference of Teachers of the American Association of Colleges of Pharmacy. One or more sessions of the Conference may be held at the time of the Annual Meeting, at the discretion of the officers.

Article IX
FINANCES

Sec. 1.

The Section shall not assess its members.

Sec. 2.

The Section shall receive one dollar from the Conference for each member of the Section.

Sec. 3

The Section shall receive a share of the Conference funds apportioned upon the total number of members of the Section.

Sec. 4.

The Section may receive donations or contributions made to the Section and may expend or invest the same in the interests of the Section at the discretion of its governing body. The receipt and expenditure of such funds must be accounted for in the Section report to the Committee.

Article X
ORDER OF BUSINESS

The order of business shall be (1) Call to order; (2) Remarks and recommendations of the Chairman; (3) Report of the Secretary-Treasurer; (4) Appointment of members to standing committees; (5) Appointment of Special Committees; (6) Receipt of resolutions and amendments; (7) Program; (8) Report of Special Committees; (9) Report of Auditing Committee; (10) Report of Resolutions Committee; (11) New Business; (12) Report of Committee on Nominations; (13) Election of Officers.

Article XI
AMENDMENTS

Sec. 1

The By-laws may be amended or changed by the presentation of the proposed amendment or change in writing at the first session of any annual meeting. The proposed amendment or change shall be voted upon at the last session, which may also be the first, of the annual meeting.

Sec. 2

An affirmative vote of two-thirds of the members present is required to effect an amendment of these By-laws.

SECTION ON MEDICAL SCIENCES — SUBSECTION ON PHARMACY NP*

American Association for the Advancement of Science

Continued from April issue 1952—Page 364

L. Gershenfeld and B. Witlin, Philadelphia College of Pharmacy and Science, Philadelphia, Pa., investigated iodine solution as a sporocidal agent. They investigated the efficiency of a 2% aqueous solution and found that it was capable of destroying the spores of **B. subtilis, B. anthracis,** and **B. mesentericus** within 150 minutes and **Cl. tetani** within 90 minutes. The spores of **B. megatherium** were not destroyed with an exposure of 330 minutes.

R. J. Ferlauto, E. J. Fellows, S. D. Bailey, W. C. Ellenbogen, and A. Heming, Smith, Kline and French Laboratories, Philadelphia, Pa. reported on Neo-penil, a new antibiotic compound which is the diethylaminoethyl ester of penicillin G. They showed that this compound has the capacity to become specifically concentrated in lung tissue in animals and they gave comparative data relative to its distribution in the tissues as related to the similar distribution of procaine penicillin.

B. M. Sutton and J. B. Data, Purdue University, School of Pharmacy Lafayette, Indiana, reported on a series of 2-amino derivatives of certain alkoxy alkanes. In addition to a description of the method of synthesis and the properties of these compounds, they related that all of the compounds possess pressor activity and that 2-amino-1-(2-methylpdopyl) propane is about half as active and one-half as toxic as Tuamine.

A. J. McBay, Massachusetts College of Pharmacy, Boston, Mass., reported on simplified pH approximations. Tables give the values which may be directly substituted in the formulas in order that the pH of different concentrations of many substances may be calculated.

P. G. Shaw and R. Bogash, Memorial Hospital, Wilmington, Delaware, reported work with sodium cellulose sulfate as a new media for the suspension of barium sulfate. They find that this suspending agent has special values in that the suspension may be further diluted with water and a semi-permanent suspension is formed that does not form impactions in the bowel. The fine dispersion and thorough suspension of the barium gives greater range of roentgenologic opacity, finer detail and clearer differentiation of certain tissues. The suspension shows promise of being a more refined diagnostic aid for the roentgenologist.

*A resumé of the paper given in Subsection on Pharmacy at the 1951 meeting in Philadelphia.

A. Purdum, Johns Hopkins University Hospital, acted as group leader and moderator in a panel discussion of specific research studies needed in hospital pharmacy.

T. A. Manzelli and H. L. Flack described the preparation of a mixed bed deionizer for the hospital pharmacist.

B. E. Conley of the American Medical Association Laboratories, Chicago, Illinois, was moderator of a panel discussion on the subject "Newer Toxicants of Medical, Economic and Pharmaceutical Interest". **A. J. Lehman,** Pharmacology Division, Food and Drug Administration, Washington, D. C., presented the pharmacological viewpoint. **E. E. Fleck,** Bureau of Entomology and Plant Quarantine, Beltsville, Maryland, presented the chemical viewpoint. **F. F. Heyroth,** Kettering Institute for Applied Physiology, Cincinnati, Ohio, presented the pathological viewpoint. **R. Blackwell Smith,** Pharmacy School, Medical College of Virginia, Richmond, Virginia, gave the medical-pharmaceutical viewpoint. **K. P. DuBois,** Toxicity Laboratory, University of Chicago, gave the chemistry and therapeutic applications of organo-phosphorus compounds.

— Glenn L. Jenkins, Secretary

New Books

Laboratory Guide in Pharmacology for Pharmacy and Dental Students.* by Harold G. O. Holck, B. S., Ph.D. Revised Edition, 1951. XIV + 129 pages. 7 illustrations. Burgess Pubishing Co. Minneapolis 15, Minnesota . Price $2.75.

Until now, the principal deficiency in the pharmaceutical curriculum has been the teaching of pharmacodynamics. The absence of a chair of pharmacodynamics from our usual course in pharmaceutical education seems to be our special privilege! Although based on incomplete information I would risk saying that this probably also holds true for the course in dentistry.

One cannot understand how a modern pharmacist or pharmaceutical chemist can be ignorant of pharmacodynamics when he must be a technical expert, yes, a scientist of medication in all its aspects; yet, such is the case. Only recently have the advanced courses in Rio de Janeiro and in Sao Paulo included pharmacodynamics. Even so, the teaching in this field is still incomplete. With lack of the necessary equipment, such teaching becomes sporadic and improvised and does not attain the objective of providing a solid foundation for the preparation of future pharmacologists.

We have great hopes that the now completed and nearly equipped Institute of Experimental Pharmacology of the Colleges of Pharmacy and Dentistry in Sao Paulo may fulfill our dreams. May its great mission

*This is an abridged version of a review of Dr. Holck's Laboratory Guide which appeared in the February 1952 issue of **A Gazeta Da Farmacia** published in Rio de Janeiro, Brazil. It is reproduced here because it gives the viewpoint of a distinguished South American educator relative to the inclusion of pharmacodynamics in the pharmaceutical curriculum.—Ed.

of creating a pharmacological mentality be accomplished!

All of these considerations came apropos of a book, which is extraordinary interesting to us in Brazil, and might well have been written for our schools of pharmacy and dentistry, which frequently are combined. The author is a member of the Department of Physiology and Pharmacology of the University of Nebraska and his book is written in a manner that singularly recommends it to fulfill our needs.

The objectives are to give the student "a clear picture of therapeutic and toxic actions in intact animals, with considerable emphasis on the treatment of the latter." The author, with an insight which reveals his teaching experience, proposes the use of a minimum of apparatus, lest the attention of the student be diverted to details of technique, as opposed to the understanding of the basic principles of the experiments.

Equally interesting and important from an economical point of view is the fact that experiments upon large animals, such as dogs, have been reduced to a minimum, and are given only as demonstrations.

The book, in the form of a laboratory manual, contains numerous questions to be answered and tables to be filled out by the students, in addition to the detailed description of the experiments, which makes it of great interest to the teacher (whose task is simplified) as well as to anyone who wishes to carry out such experiments for self-education. However, in general, its use demands the orientation of a teacher. The small number of drawings are very clear and useful and reserved for the more complex techniques and apparatus.

The experiments were selected for their significance and are presented with extreme clarity. As an example, the description of the assay of digitalis by the pigeon fatal dose method serves as a valuable introduction to the study of bioassay.

The author frequently employs films as an aid to teaching. The great majority of these are not available in Brazil, but the example should stimulate us to increase our efficiency in the teaching of pharmacy to that degree which has been accomplished by the National Institute of Educational Films in general education.

In resumé, the book of Harald Holck should be included in the libraries of all the schools of pharmacy to aid the professors of their various areas to include suitable pharmacological experiments in the absence of a specific chair in pharmacodynamics. The book will also be valuable to the post-graduate student, to those in biological control, in pharmaceutical industry, and in research laboratories as it contains welcome directions for many simple and useful techniques.

It should be very interesting to the professors and students of physiology, pathology and therapeutics in the schools of dentistry, where the teaching should be benefitted by the inclusion of some simple significant demonstrations, mainly in the field of anesthesia.—C. H. Liberalli, Professor of Galenical Pharmacy, University of Sao Paulo, Brazil.

E. A. Brecht, Dean

North Dakota

North Dakota Agricultural School of Pharmacy, Fargo. (1922)
W. F. Sudro, Dean

Ohio

Ohio Northern University, College of Pharmacy, Ada. (1925)
Albert C. Smith, Dean
University of Cincinnati, Cincinnati College of Pharmacy. (1947)
J. F. Kowalewski, Dean
Ohio State University, College of Pharmacy, Columbus. (1900)
B. V. Christensen, Dean
University of Toledo, College of Pharmacy, Toledo. (1941)
Charles H. Larwood, Dean

Oklahoma

Southwestern State College, School of Pharmacy, Weatherford. (1951)
W. D. Strother, Dean
University of Oklahoma, College of Pharmacy, Norman. (1905)
Ralph W. Clark, Dean

Oregon

Oregon State College, School of Pharmacy, Corvallis. (1915)
George E. Crossen, Dean

Pennsylvania

Duquesne University, School of Pharmacy, Pittsburgh. (1927)
Hugh C. Muldoon, Dean
Philadelphia College of Pharmacy and Science, Philadelphia. (1900)
Ivor Griffith, Dean
Temple University, School of Pharmacy, Philadelphia. (1928)
Joseph B. Sprowls, Dean
University of Pittsburgh, School of Pharmacy, Pittsburgh. (1900)
Edward C. Reif, Dean

Philippines

University of the Philippines, College of Pharmacy, Quezon City. (1917)
Patrocinio Valenzuela, Dean

Puerto Rico

University of Puerto Rico, College of Pharmacy, Rio Piedras. (1926)
Luis Torres-Diaz, Dean

Rhode Island

Rhode Island College of Pharmacy and Allied Sciences, Providence. (1926)
W. Henry Rivard, Dean

South Carolina

School of Pharmacy, Medical College of South Carolina, Charleston. (1940)
William A. Frost, Dean
University of South Carolina, School of Pharmacy, Columbia. (1928)
E. T. Motley, Dean

South Dakota

South Dakota State College, Division of Pharmacy, Brookings. (1908)
Floyd J. LeBlanc, Dean

Tennessee

University of Tennessee, School of Pharmacy, Memphis. (1914)
Robert L. Crowe, Dean

Texas

University of Texas, College of Pharmacy, Austin .(1926)
Henry M. Burlage, Dean

Utah

University of Utah, College of Pharmacy, Salt Lake City. (1951)
L. David Hiner, Dean

Virginia

Medical College of Virginia, School of Pharmacy, Richmond. (1908)
R. Blackwell Smith, Dean

Washington

State College of Washington, School of Pharmacy, Pullman. (1912)
P. H. Dirstine, Dean
University of Washington, College of Pharmacy, Seattle. (1903)
Forest L. Goodrich, Dean

West Virginia

West Virginia University, College of Pharmacy, Morgantown. (1920)
J. Lester Hayman, Dean

Wisconsin

University of Wisconsin, School of Pharmacy, Madison. (1900)
Arthur H. Uhl, Dean

Wyoming

University of Wyoming, College of Pharmacy, Laramie. (1951)
David W. O'Day, Dean

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To meet the demonstrated need for trained teachers and researchers in the field of pharmacy, the American Foundation for Pharmaceutical Education announces a limited number of Fellowships for students seeking graduate degrees in pharmaceutical subjects.

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PHARMACY ADMINISTRATION
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